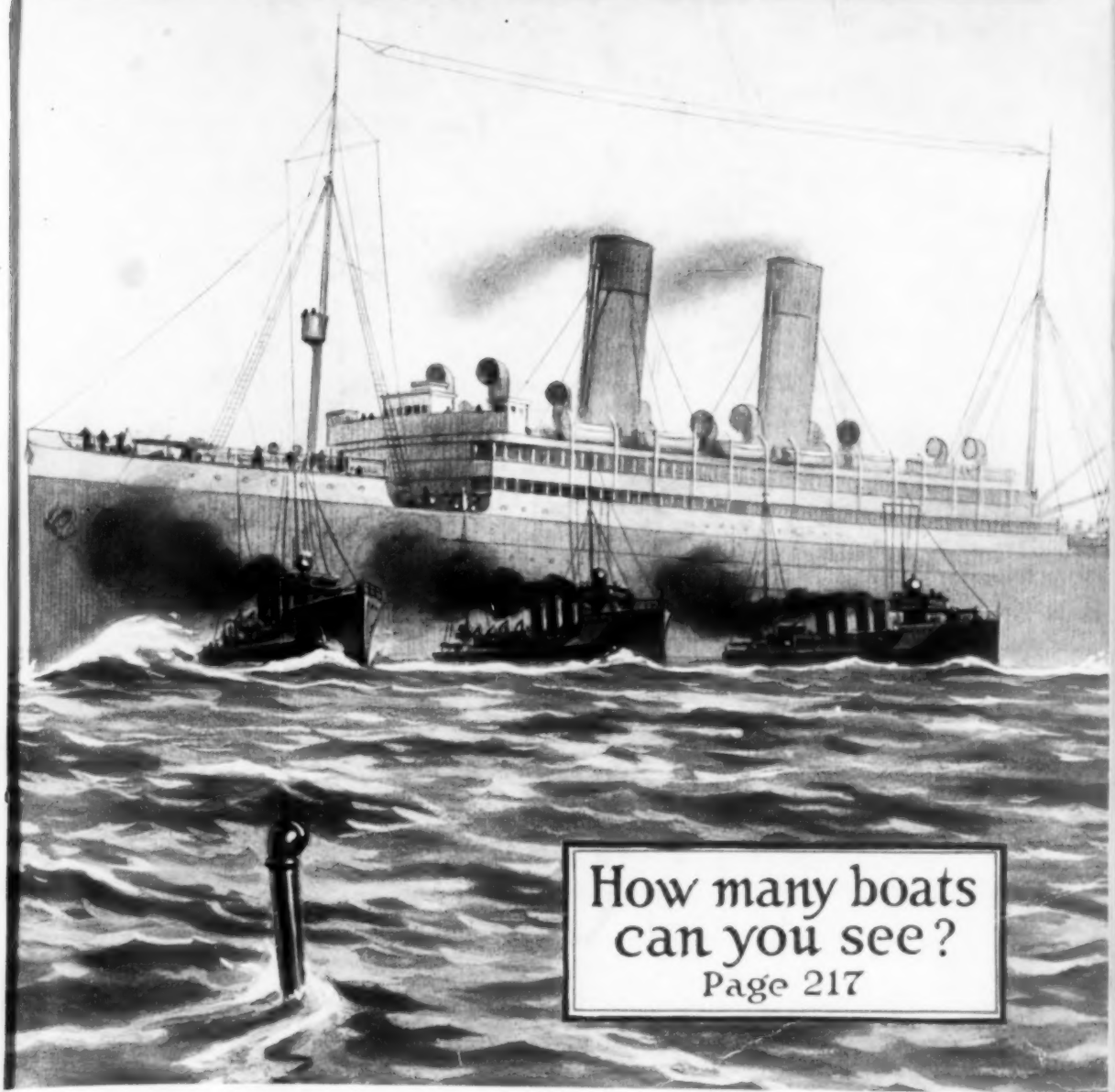
POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG. U.S. PAT. OFF.



How many boats can you see?

Page 217

Learn Auto and Tractor Business

IMMENSE increase in production and use of Automobiles, Trucks and Tractors now that war is over, coupled with the most urgent demand for sales agents and motor mechanics, makes this your greatest opportunity to qualify easily and quickly to make big money.

Start a Repair Shop

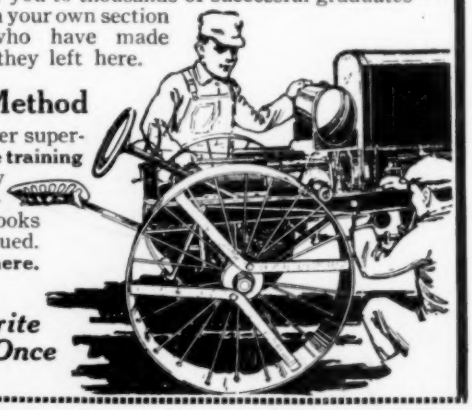
Inter-community Truck hauling, establishment of thousands of Rural Motor and Aviation Mail Routes, universal expansion of State and National Highways, general use of farm tractors for intensive cultivation and large acreages, combine to make greatly increased maintenance and repair shop facilities needed at once. Only small investment necessary to get into business for yourself and make big money. Thousands of towns and rural communities need Garages and Repair Shops.

Immense Equipment

More than doubled equipment in every department by huge additional quantity of equipment from our former Military Division —up-to-date Autos, Trucks, Tractors, Block-Mounted Motors, Electric Apparatus and every other equipment. Acres of floor space of modern fire-proof construction. Fine heating, ventilation and flood daylight on all floors.

Learn Here in 6 to 8 Weeks Earn $100 to $400 a Month

Any man 16 years of age and over, who will apply himself, can learn here. We refer you to thousands of successful graduates—many of them right in your own section of the country—who have made good from the day they left here.



Easy to Learn by the Rahe Practical Method

Daily work on this enormous, up-to-date equipment under supervision of numerous Master Mechanic Instructors. **Same training as used to qualify soldier mechanics in 60 day courses.** Only additional cost to take your training at "World's Greatest" Auto and Tractor School is difference in carfare. No books used. No "Extras" to buy. Only Life Scholarships issued. **Plenty of opportunity to earn part living expenses while here.**

Special Tuition Rate Now!

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MAIL THIS COUPON TODAY for 7-Day Trial Offer, wonderful story of opportunities and big 64-page illustrated catalog **FREE**

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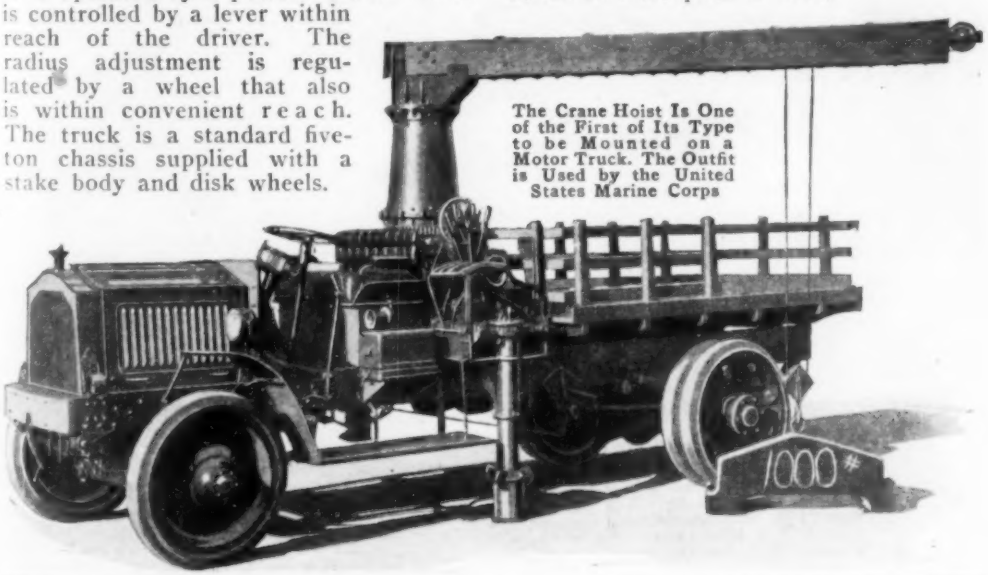
Age.....*Occupation*.....

SALT HAM HELPS NAVY ELEVEN WIN ON GRIDIRON

To very salt ham, served once a week, sailors in training on Chicago's municipal pier give a large share of credit for their football team's phenomenal success the past season. Football experts, who know the rigid discipline under which the navy men live and their rather monotonous diet, on hearing that the navy eleven was to have a season a month longer than is usual, predicted that the team would "go stale." But the commissary steward, once a player himself, believed he could keep the men in good fettle despite this handicap. His plan was to serve very salt ham once a week, causing the players to drink quantities of water. In the opinion of those who ventured thus to disregard conventional training rules, this kept the men from "going stale" by relieving their systems of congestion. The team's victories are pointed to as a vindication of the diet.

CRANE IS MOUNTED ON TRUCK USED BY MARINE CORPS

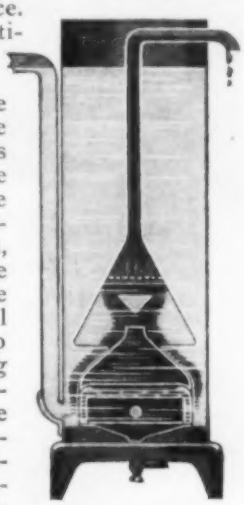
Included in the motor equipment of the United States Marine Corps is a specially outfitted truck that mounts a crane hoist with a 10-ft. boom. Jacks are provided at opposite sides of the chassis to relieve the frame of undue strains. Working at a radius of about seven and a half feet, the hoist has a lifting capacity of two tons. It is operated by a power take-off which is controlled by a lever within reach of the driver. The radius adjustment is regulated by a wheel that also is within convenient reach. The truck is a standard five-ton chassis supplied with a stake body and disk wheels.



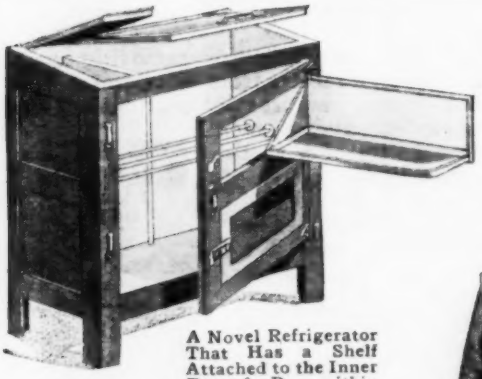
The Crane Hoist Is One of the First of Its Type to be Mounted on a Motor Truck. The Outfit is Used by the United States Marine Corps

COMPACT OIL SEPARATOR OPERATES BY GRAVITY

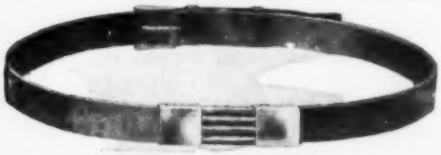
A new separator for removing water and foreign matter from oil operates without power, requires little attention, and occupies small space. It consists of a vertical cylinder containing especially arranged baffles. The oil enters near the bottom and flows into a circular guide designed to allow the solid matter to settle to the bottom, whence it can be drawn off. As the cylinder fills, the oil and water pass up through an opening in the top of a conical cover over the guide. The oil, being the lighter, accumulates in a second conical baffle, suspended above the one just mentioned, and, as the level of the water rises, passes off through a pipe which is an extension of the cone. A second outlet, for the water, is connected at the bottom of the separator and rises to the level at which it is desired to maintain the water within. If further cleansing of oil which has passed through the separator is desired, a series of filter pads is used.



SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



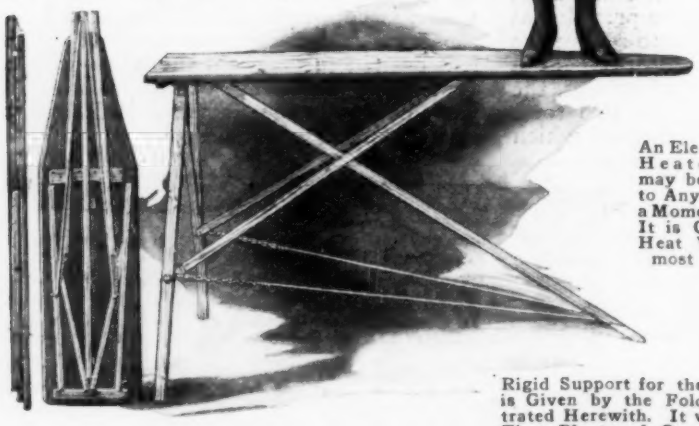
A Novel Refrigerator That Has a Shelf Attached to the Inner Face of a Door within a Door



Men's Belt, Made Elastic by Insertion of Four Coiled Piano-Wire Springs at Rear

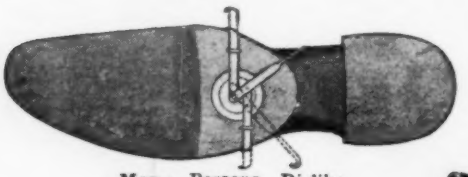
Quite an Appropriate Memento of the War, for Those Who Have a Relative in the Service, Is the Service-Star Candlestick, Two Forms of Which are Shown

An Unusual Souvenir for Patriotic Functions—a China Bee Decorated in Red, White, and Blue. It may be Worn on a Coat Lapel or Pinned to a Place Card



An Electric Water Heater That may be Attached to Any Faucet in a Moment's Time: It is Claimed to Heat Water Almost Instantly

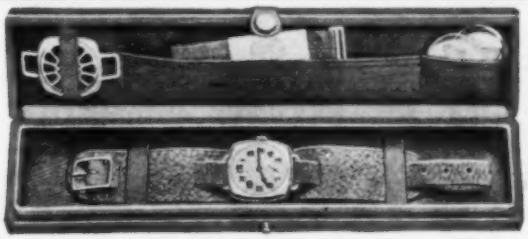
Rigid Support for the Ironing Board is Given by the Folding Rack Illustrated Herewith. It will be Observed That Plenty of Open Space is Provided beneath the Board at the Small End



Many Persons Dislike Wearing Clumsy Rubber Shoes in Rainy Weather. For Them the Rubber Sole with a Mechanical Clamp, Here Shown, is Especially Intended

Convenient Serving Fork with Pusher Attachment That Enables a Portion of Meat to be Dislodged Readily from the Tines: The Device Has No Spring. It is Actuated with the Forefinger

An Economical Oven That Fits in the Doorway of a Furnace and Utilizes the Latter's Heat, Thereby Obviating Necessity of Using a Range



For the Man in the Service: A Wrist-Watch Set with an Extra Strap, Two Extra Crystals, and a Crystal Guard

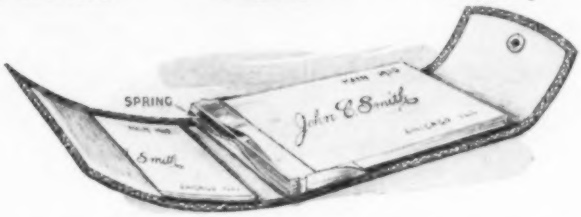
This Military Wrist Watch Includes a Small Compass, Obviously of Convenience to the Soldier or Sportsman

For the Modern Kitchen: Five Separate Wall Racks Holding Moisture-Proof Glass Jars of Different Capacities, Each Instantly Removable

Patriotic Emblem for Coat Lapel, Framing Miniature Portrait of Soldier: The Eagle Is Gold Plated and the Flag Enameled in Colors

Suburbanites Whose Telephone Calls Are Frequently Long-Distance Ones will Find This Three-Minute Sandglass a Mort Convenient Accessory

Here Is a Screen That may be Rolled Like a Window Shade, a Feature That Meets the Storage Problem in Winter and Also Simplifies Window Washing in Summer



This Case is Supplied with a Spring Clamp That Holds One's Unbound Business and Visiting Cards in Book Form and Permits Them to be Removed One at a Time, without Disturbing the Pack

FROM A GERMAN PRISON TO THE ARCTIC

By ALFRED L. FLUDE

LAST summer, in Mourmansk, Russian Lapland, I met Harry Drope, of Brandon, Manitoba, formerly a member of the Princess Pat Regiment. He had escaped from a German prison camp into Russia, and at last into the Arctic on his way back to England, where he once more reported for duty. This is the way he told his story while we were sitting on a lifeboat on the well deck of H. M. T. "The Czar," carrying 1,300 refugees, who had escaped from all over Russia, down to England.

"I was captured in 1915 and sent to a German prison camp where the food was very bad and the work was very hard. The worst time in the life of a prisoner under the Germans is those first weeks before the Red Cross locates him and sends him enough food to keep body and soul together. We were given a few ounces of black bread daily and a bowl of soup with no food value, and which smelled so badly that it was simply impossible to eat it.

"I was captured in 1915 and sent to a German prison camp, where the food was very bad and the work was very hard."

"Within a few weeks I was transferred to a camp in German Poland, where we were employed in rebuilding the villages which had been destroyed by the Russians. It was good outdoor work, and as soon as my food packages came regularly, I thrived on it. I determined to escape into Russia, however, and planned with two Russian soldiers for the attempt. For several weeks we saved a portion of our food each day until we had sufficient for two weeks, which we thought would give us time enough for the trip. When the time came, we managed to hide behind the huge oven in the bakery, when the others returned to the barracks. At 10 o'clock we started, depending on the stars to guide our course due east. Before daylight we hid in a field of barley and remained there for the entire day. This was our procedure during the entire trip.

"At the end of two weeks our food was exhausted, but we were far from the Russian lines. We went to the home of a Polish peasant, waked him, and told him we must have food. He gave us potatoes and black bread, and promised not to tell of our visit. However, we made it a rule to make these visits before midnight so we would have a good start before we could be reported to the military. We were never refused, and many of the poor people gave gladly and wished us success.

"Just as we were congratulating ourselves that the journey would soon be over, we walked right into the arms of a German sentry and were promptly arrested by him. However, three prisoners at one time were more than he could master, and before he realized what had happened, there was a mix-up in the dark, and two of us were running through the underbrush into the forest. He kept firm hold on one of the Russians, however, and that was the last we ever saw of him.

"Twenty-six days from the time we started, we reached the trenches. The Germans were on one side of a river and the Russians on the other. The German lines were well guarded and were further protected by barbed-wire entanglements, heavily charged with electricity. As we crawled along the line, we could see in the moonlight the bodies of Russians who had attempted to go through. We were hiding in a huge shell hole close by the bridge, upon which we could see a German sentry walking. Suddenly we heard the clatter of a pony and cart crossing from the Russian side. We heard a man call

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to the sentry in Yiddish and finally come on toward the German side. My companion, who was a Russian Jew, called to the driver cautiously, in Yiddish. The pony was stopped and the man came toward us. He listened to the story, gave us some black bread from his cart, and asked us if we had any money. We offered him all we had, about 14 marks. 'That is too much,' he said. 'Give me seven marks.' He signed for us to follow and walked boldly back across the bridge, calling to the guard that he had forgotten to give him some cigarettes. As we drew near he told the guard that he had met two Yiddish friends who wished to go back to the Russian side, at the same time handing him the cigarettes and the money. The sentry waved us on and we walked slowly past him toward freedom. Up and down my back the chills were running, and I wondered how soon and where his bullet would strike, for I could hardly believe that he would be so easy. At last we reached the other side, and took to our heels into the shadows and were safe.

"After that it was simply a question of getting through the Bolshevik lines and into the North. Here my Russian companion was of inestimable help. At last I reached the Petrograd-Mourmansk Railroad and followed it until at last I reached the English-Serbian lines and went into Mourmansk on a real freight train. Why speak now of the hardships of the whole trip? I forget them and regard myself as unusually fortunate in having escaped.

"I am going back to London to report

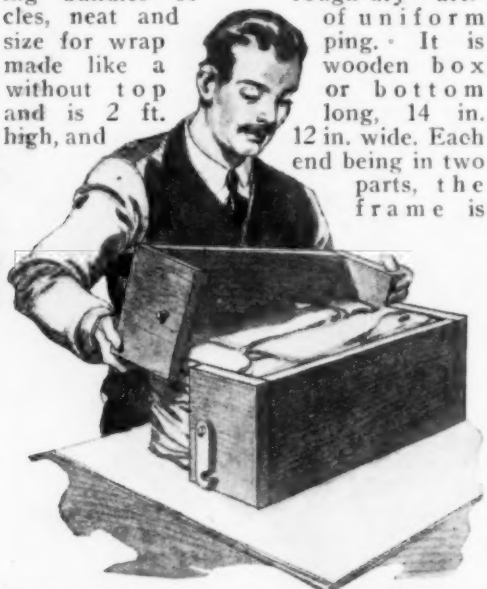
"Before he realized what had happened, there was a mix-up in the dark, and two of us were running through the underbrush into the forest."

and will probably be at the front again in less than a month. I hope the war will not end until I have had my chance to repay the Hun for what he made me and others suffer as prisoners. I wish I knew how that other Russian fared!"

"As we drew near he told the guard that he had met two Yiddish friends who wished to go back to the Russian side, at the same time handing him the cigarettes and the money. The sentry waved us on and we walked slowly past him toward freedom."

FRAME AIDS LAUNDRY WORKERS IN WRAPPING BUNDLES

A convenient accessory for commercial laundries is a wooden frame used in making bundles of rough-dry articles, neat and of uniform size for wrapping. It is made like a wooden box without top or bottom and is 2 ft. long, 14 in. high, and 12 in. wide. Each end being in two parts, the frame is

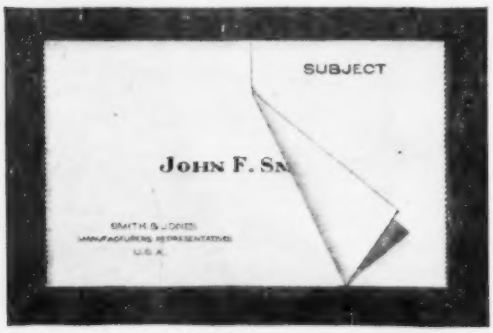


Handy Wooden Frame Used by Laundry Workers as a Form in Which Articles are Piled Preparatory to Wrapping Them into Bundles of Uniform Size

divided into halves which are held together by simple clamps, dowel pins helping to keep them in alinement. The frame is placed on the wrapping paper and the laundered material is packed into it, after which the halves are removed.

BUSINESS CARD WITH FLAP FOR BRIEF MESSAGE

Convention has been departed from in designing a business card which is provided with a flap intended to be folded either against the back or the front of the main portion of the card. At the top of the flap is the word "subject," beneath which the one seeking an interview can indicate in a few words the nature of his errand and thereby can often save time for himself and others concerned.

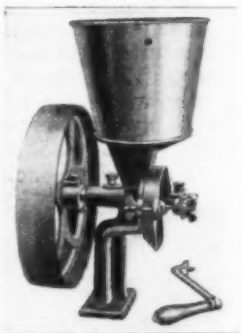


Business Card with a Detachable Flap on Which can be Written a Brief Message to the Person with Whom an Interview is Sought

NEW YORK TO ERECT ARCH AS WAR MEMORIAL

Very soon after the coming of peace New York City officials began making plans for a victory arch in honor of the Americans who fought in the great war. The proposal is to determine as soon as possible the general character of the structure and then erect a temporary arch in conformity with those ideas, before the majority of the troops return home. A number of prominent artists and architects have been selected to draw up plans and specifications. The board of aldermen has authorized the issuance of $80,000 in special revenue bonds with which the memorial will be erected on Fifth Avenue, at Madison Square.

EASILY OPERATED FLOUR MILL FOR HOUSEHOLD USE



It is believed that the war has created a demand for home-ground flours of various degrees of coarseness, which will be permanent among housewives. To meet this demand a small hand-operated mill, moderately priced, has been placed on the market. It fastens to the edge of a table and stands 19 in. high. A crank handle and a small flywheel make its rapid operation easy. The two grinding burrs are easily adjusted by a thumbscrew for grinding corn, wheat, barley, rice, rye, etc., to the desired degree of fineness.

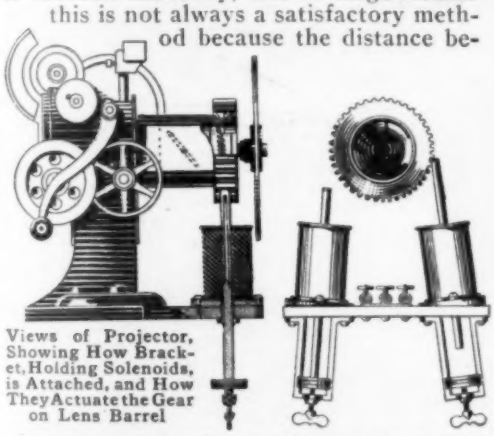
¶ Business interests in Tokyo, Japan, are planning extensive development of the port at Ominato, which is now only a small naval center at the northern end of the largest of the empire's islands, but promises to become an important transshipment point between the United States and northern Asia.

OVERCHARGING FOR HOTEL-PHONE SERVICE ENDS

One of the petty overcharges which have annoyed hotel guests in many large cities has been abolished by an order from the postmaster-general, who has control of the telephone systems of the country. This order provides that hereafter hotels, apartment houses, clubs, and similar institutions, shall not charge any guest or member more for the use of the telephone than is charged in public pay stations. The managements of these places are also forbidden to charge more for private-branch exchange stations than they, in turn, are required to pay.

FOCUSING MOVIE PROJECTOR FROM BODY OF THEATER

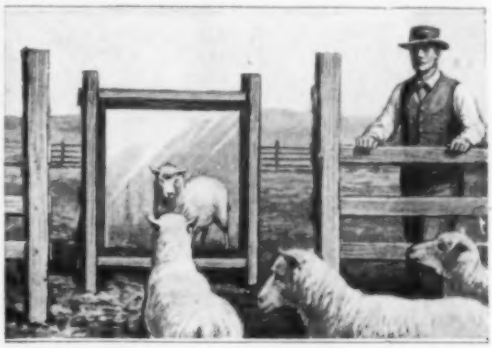
Among the recent inventions intended to improve the projection of moving pictures, there is an electric focusing system that may be controlled from any part of a theater. Usually the lens of a projector is focused manually, but in large houses this is not always a satisfactory method because the distance between the projection booth and the screen makes it difficult for an operator to determine the sharpness of a picture. The latest plan for obviating this trouble consists in fitting a ring gear over the milled bead that rotates the lens barrel, and actuating the former by means of two solenoids connected in a three-wire circuit controlled by a pair of push buttons, preferably installed in the middle of the theater about 14 ft. from the screen. An operator stationed at this point is able to watch the screen and refocus the lens when needed, by pressing one or the other of the push buttons. The latter control separate solenoids, one causing the lens barrel to be moved forward, and the other backward.



Views of Projector, Showing How Bracket, Holding Solenoids, is Attached, and How They Actuate the Gear on Lens Barrel

SHEEP DRIVEN INTO PEN WITH AID OF MIRROR

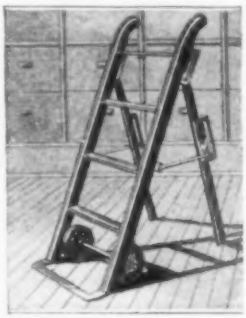
By placing a mirror, 3 ft. square, opposite the opening through which sheep were to be driven, an Australian grower has been able to get the animals to pass into pens where they were wanted, without difficulty. True to its well-known habit of following the lead of its fellows, each sheep on seeing its own likeness in the mirror thought it was another of the flock and passed through the opening at once. While the device has been employed only as indicated and by but one ranchman, so far as is known, doubtless there are many places where it could be used.



A Mirror Installed Opposite the Entrance to a Sheep Pen Makes the Animals More Ready to Enter the Gate, Because Each Takes His Reflection to Be Another Sheep Already in the Inclosure

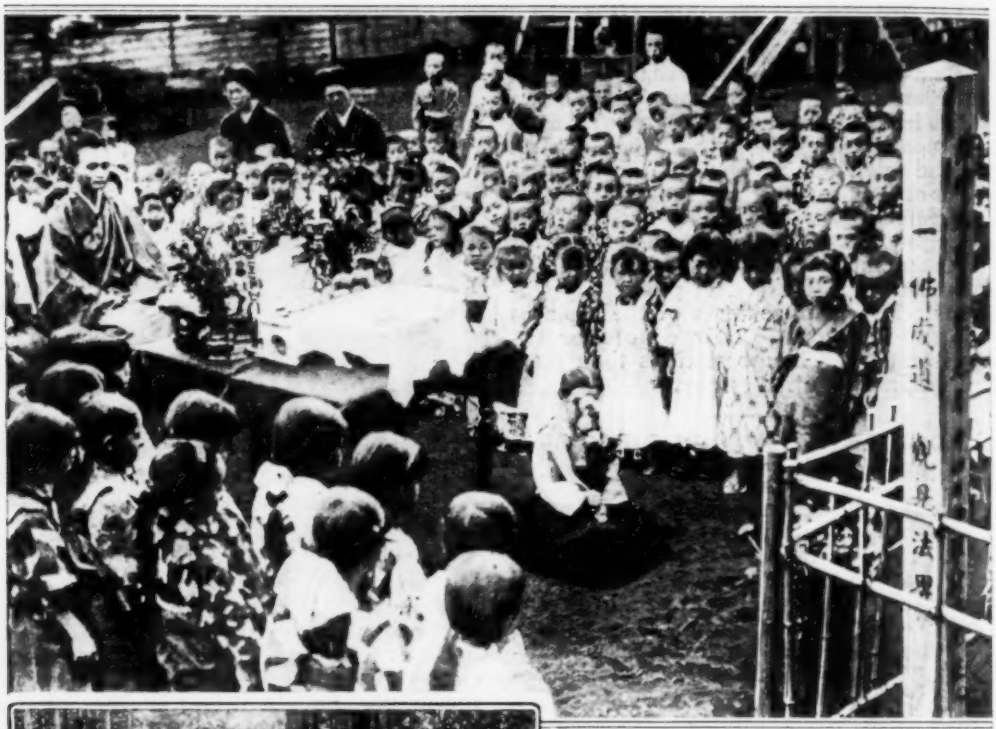
STEPLADDER AND HAND TRUCK ARE COMBINED BY INVENTOR

A hand truck that also serves as a stepladder has recently been invented. The device is fitted with four treads and at the rear side has a hinged support that fits in front of the axle, out of the way, when not in use. An additional advantage of the combination is that the support will hold the truck in loading position and thereby give the operator complete freedom when tipping or moving a heavy crate or barrel.



¶A few weeks ago a huge aeroplane carrying 35 passengers flew to Paris and return from a point 40 miles distant.

VARIOUS ACTIVITIES OF BOYS AND GIRLS.



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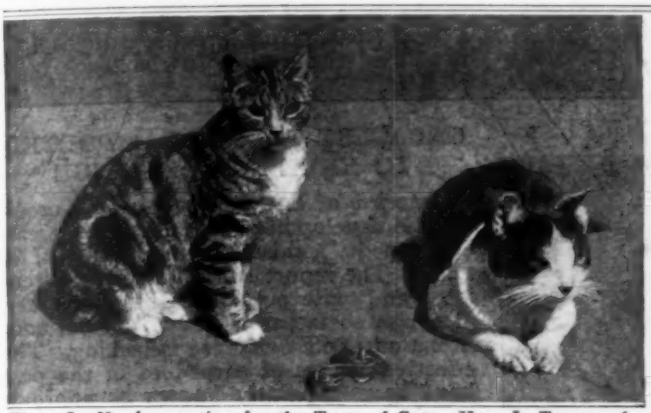
Little Children in Japan are Wonderfully Devoted to Their Dolls, and When the Time Comes to Discard Any of Them, Something Like a Funeral is Held. This Picture Shows the Oriental Little Folk from One of the Japanese Elementary Schools Attending One of These Sad Gatherings

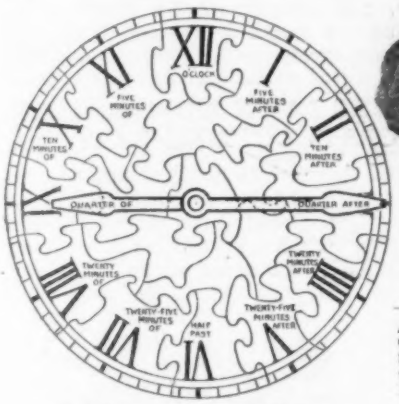
At One End of the Cabin Is a Kitchen, While the Biggest—and Most Eagerly Visited—Room Is the Dining Room, with Its Great Fireplace

About 60 Miles from Their Home City, the Boy Scouts of Portland, Oregon, have Built This Splendid Log Cabin near Wahtum Lake, on Leased Land in the Oregon National Forest. The Building Measures 100 by 50 Feet and is Made of Peeled Silver-Fir Logs. As can be Easily Imagined, It Is the Goal of Many a Memorable Hike Taken over One of Two Beautiful Trails, Which are Maintained by Forest Rangers



There Is No Accounting for the Taste of Cats. Here Is Tommy, for Example, a Perfectly Nice Connecticut Puss, Who Went Out One Day and Brought Back a Snake for the Entertainment of His Tiger-Striped Daughter, Milly. Tommy's Master Believes That the Family Pet Started Out to Get Frogs, but, Coming upon This Snake by Accident, Simply could Not "Pass It Up"

The Closest Call the Snake Ever Had: Milly Put Her Teeth into Him a Little Way, but did Not Like the Taste, and So, after Giving Him an Awful Scare, Let Him Crawl Away, Scot-Free



A Jig-Saw Puzzle That will Help a Child to Learn to Tell Time: On Each Piece is Shown the Value, in Minutes, of the Accompanying Numeral

A "Close Up" of Steve's Ground Hog, Which, He Says, Sleeps through the Winter until Ground-Hog Day, When He Comes Out to Look for His Shadow

In Rocky Hill, Connecticut, Everybody Knows Steve Reduker, the Boy Who Lost One Leg Over Three Years Ago, and They Like Him for His Pluck and Love of Pets, One of Which, His Ground Hog, is Shown with Him

This Little Pig Never "Went to Market" or "Had Roast Beef," but He did Have Something He Liked Much Better, Namely, Milk from a Cow Which Nursed Him

GERMAN WAR-TIME CLOTH MADE OF PAPER

A war-time product of German weavers, reports of which excited not a little interest, was the so-called cloth made of paper. Photographs recently secured of specimens of this fabric show that it is very coarsely woven, the threads appearing to be as large as coarse wrapping twine. In some cases a pattern was printed or stenciled on the material. Undoubtedly a great deal of experimenting was necessary to make possible the production of even this rather crude cloth.

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Specimen of a Substitute for Cloth Made by German Weavers during the War

NEW ALL-METAL HAND TRUCK A PINCH BAR ON WHEELS

A new hand truck for moving light or heavy loads with comparative ease resembles a large-size pinch bar, mounted on three wheels. The truck is made entirely of malleable cast iron, and there are no bolts or other parts apt to need replacing. The lower end, which is inserted under the article to be lifted, is broad and slightly curved. The two forward wheels, beneath it, have 2½-in. treads and are 3½ in. in diameter, while the third wheel, a few inches to the rear, is 5 in. in diameter and has a 1-in. tread. The leverage ratio is 13½ to 1, and the weight of the truck is 34 pounds.

All-Metal Hand Truck Made Like a Pinch Bar; It will Stand Alone Vertically or at an Incline

GREATEST TORPEDO REPORTED TO HAVE 20-MILE RANGE

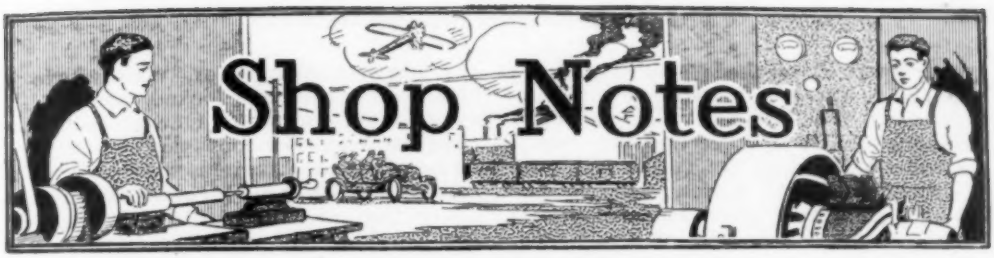
America of late has been given credit for the development of the world's greatest torpedo, a missile with a range of 20 miles. The report has been widely circulated and quite possibly is based on fact, although so far as is known official confirmation of its existence is lacking. The effective ranges of torpedoes in the past have been popularly known as approximately five miles for the largest size, and about three miles for others. The use of a torpedo against a target beyond the range of vision obviously would entail serious difficulties. Therefore, granting that a 20-mile torpedo has been placed in service, the details of its construction could be no more interesting than the means employed for its effective use.

ELECTRIC LAWN MOWER MAKES GRASS CUTTING EASY

One of the newest applications of electric motive power to machinery is a motor-driven lawn mower which is as easy to push about as an empty baby carriage. A ⅛-hp. motor is mounted on the implement and drives the blades by means of a belt, but does not propel the mower. Current is obtained through an extra long flexible cord connected with the nearest socket. The motor drives the cutting machinery while the operator pushes the implement about.

APPLE BARRELS PROVIDED WITH GLASS TOPS

An innovation at a recent apple display held under the auspices of the Illinois State Horticultural Society was the glass tops in the apple barrels. The glass used was thick and was held in place by nails in the usual way. These transparent tops made it very convenient to inspect the fruit whether the barrels were placed on end on the floor or piled in rows on their sides.



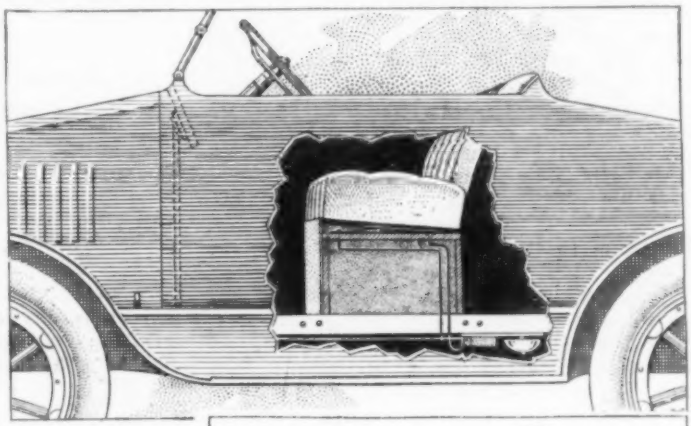
Automobile-Thief Alarm

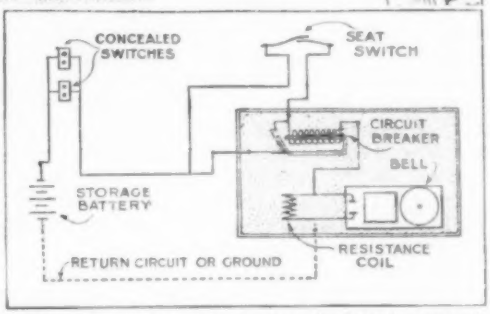
By E. W. RANSTON

MANY good and efficient automobile locks have been called into existence by the epidemic of automobile thefts, and there is now no excuse for leaving a car unprotected. The locks in general use are of several classes, each presenting its own advantages and open to its own objections. Electrical locks for merely breaking the ignition circuit were the first on the scene, and are still used to some extent, although no expert automobile thief would be delayed by them for more than a few seconds, as he would simply connect around the "lock" with a wire leading directly from the battery to the igniter. Gasoline-line locks are useful, but somewhat complicated in their installation, and introduce the questionable element of additional opportunity for gasoline leakage. Probably the favorite method is a purely mechanical lock, on the steering gear, the starting crank, or some other essential part of the mechanism.

While all of these locks may be relied upon to prevent or at least delay considerably the work of the thief, few, if any, of them are of any assistance to the police in capturing the would-be thief. The device here described is intended to accomplish this purpose, and at the same time furnish a protective device with all the convenience of the ignition lock.

The effect of the contrivance is that, when a thief enters the car and takes his place in the driver's seat, an invisible alarm bell under the car starts ringing, and continues to ring even after the thief leaves his seat and seeks safety from the police or citizens who are sure to be attracted by the noise of the bell. The bell will continue to ring until the owner returns to the car, or until somebody finds the hidden control switch and turns it off. Of course, if the thief is ingenious enough to find this switch at once, he can turn off the alarm himself, but there is small chance of a thief working very long around a car to the accompaniment of a loudly clanging bell.





As the Thief Takes His Seat at the Steering Wheel, He Sets Going an Invisible Alarm Bell, Which Continues to Ring Until Switched Off by a Concealed Switch in Another Part of the Car

The various parts of the circuit and their connection are shown in the diagram. The materials needed are: one or more small switches to be concealed as well as possible within reach of the driver; a good, loud electric bell; a relay, or circuit breaker, such as is used on nearly all modern automobiles to connect the generator to the battery when the

proper speed is reached; some resistance wire, large enough to carry several amperes of current, and some pieces of wood and spring brass to make the seat switch. As will be noted in the circuit diagram, when the concealed switch is closed and the seat switch is afterward closed, the circuit through the bell is established, and, at the same time, the current flowing through the circuit breaker closes a circuit which connects around the seat switch so that, even though the latter is open, the bell continues to ring. The resistance coil would not be necessary if the circuit through the bell was continuous. Since, however, it is interrupted at each tap of the bell, the coil is necessary, in order to maintain a sufficient current through the circuit breaker to keep it from permitting the shunt circuit across the seat switch to open, thus stopping the alarm. The only way in which the alarm can be stopped is by breaking the main circuit, either at the concealed switch or at some other point. If properly wired, this cannot be done by a stranger without spending considerable time, which, under the circumstances, is out of the question for a thief, at least in a city or town.

The making of the seat switch will not be difficult for any electrical experimenter, and its successful working must, of course, be tested by experiment. The sketch may give a suggestion. It will be advisable to carry the two wires from the seat switch directly down below the car, where the circuit breaker, bell, and resistance coil can readily be mounted in one removable unit. As the current first comes through the seat switch, it will close the contact points; as the seat switch is opened, the current flows through the shunt circuit, including the contact points, and keeps the points closed until the main circuit is broken.

The unit under the car, consisting of the bell, circuit breaker, and resistance coil, will have two wires leading from it: one to the seat switch and one to the concealed switch. If the car is wired on the double-wire system, there will also have to be a return wire to the battery. With the grounded-battery system, there is simply a connection from the unit under the car to some screw or nut on the frame of the car.

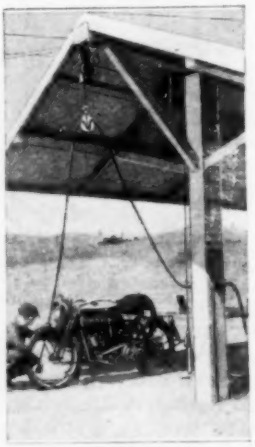
The concealed switch may be located in a pocket on the door, just behind the dash board, under a corner of the floor mat, or any other place where it will be out of sight; or it may be built into a combination, or key, lock. Ignition locks designed for use with magnetos, which have a closed circuit when locked, are readily used for this purpose. One advantage to be gained by the concealed-switch idea, however, is that there is no visible indication that the car is locked, thus encouraging the thief to get himself trapped. Car owners who regard this as a disadvantage, preferring to notify the thief in advance that the car is protected, may use a lock switch. If the thief then connects across the two wires leading to it before taking his seat at the wheel, he will not have prevented the gong from giving the alarm. Using two or more concealed switches presents an additional advantage, as closing any one of them throws on the alarm, and all must be open to throw it off.

Etching on Glass and Metal with a Sandblast

A sandblast may be made use of in many novel ways. Any part of an electric-light bulb may be frosted by covering the other part of the glass with a piece of heavy paper, and exposing to the sandblast. A similar process will serve to etch any lettering or design on any glass or polished-metal article, and a finish may be given to soft wood which gives it the appearance of being hand-engraved.

Weight and Pulleys Keep Air Hose Convenient and Reduce Wear

The usual air-hose arrangement about garages and service stations is frequently a source of annoyance to both motorists and attendants alike, and when the hose is dragged about on the ground, it is very short-lived. The weight-and-pulley mounting, illustrated in the accompanying photograph, keeps the hose up out of the dirt at all times. Its position is convenient for getting at all four wheels of a car; it is in the shade, and is not needlessly worn by being dragged out over the



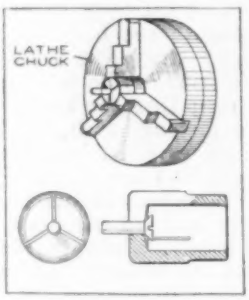
ground or left in a position to be run over by machines. This type of hose support costs little to install, and will pay for itself many times by the convenient service it renders and the reduced wear on the hose.—John Edwin Hogg, Alhambra, California.

Moving "Rusted-In" Screws

Steel screws which have rusted into place are difficult to remove. They can often be loosened by tapping the screwdriver with a hammer, or by heating, but a better way is to treat them before setting them in place with a rust preventive. Common oil will do this to a slight extent, but a mixture of graphite and tallow rubbed onto the screw, will be effective for a much longer time.—S. Leonard Bastin, Bournemouth, Eng.

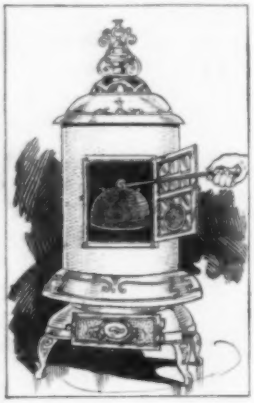
Holding Screws While Threading or Turning Them

When small screws must be turned or threaded in the lathe, time is often lost because no chuck is at hand which fits the screw. A collet, to be held in the chuck, and to hold securely the size of screw for which it is designed, is made from a piece of round steel. It should be about 1⅛ in. in diameter, and its length should be somewhat greater. Drill a hole clear through it, the size of the screw to be held; then, from one end, ream this with a ¾-in. drill, to within ¼ in. of the other end. Turn down slightly the half of the piece from which the ¾-in. hole was started, so as to provide clearance. With a hacksaw, saw three or four slots, as shown, so as to form a spring collet. The number of slots should be the same as the number of jaws in the lathe chuck. The collet may be hardened, or casehardened if convenient, and its life will then be much longer. If the collet is accurately made, a universal chuck will be satisfactory to use with it; for extreme accuracy, however, which is often necessary in small work, the chuck with independent jaws is to be preferred.—E. L. Howard, Springfield, Ohio.



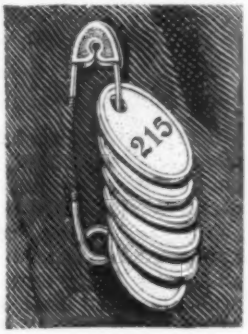
Large Kettle Inverted over Soft-Coal Fire Saves Heat

On putting fresh soft coal into a stove, an intense smoke is given off, which fouls the pipes and spreads soot over the room, besides wasting coal. A means for diminishing this was found in a large iron pot. The pot was provided with a ring on the bottom, by means of which it could be carried on the end of the poker. Immediately after putting on fresh coal, the inverted pot was set on top of the fire and was found to have the effect of causing the smoke and coal dust either to collect inside the pot or to escape around the edge, where the gas would burst into a ring of flame, consuming much of the coal dust, which would otherwise be wasted. The kettle is left on until the fresh coal becomes hot and is reduced to coke by having the gas roasted out of it; the pot is then removed, leaving a coke fire, which burns and lasts very well.—A. S. Thomas, Amherstburg, Ontario, Can.



Carry Tool Checks on a Safety Pin

In shops where each workman has a number of tool checks bearing a number, one of which he deposits in the tool room as a receipt for a tool taken out, the loss of these checks may sometimes involve unpleasantness. A safer way of carrying them than in the pocket is to sew a large, strong safety pin to the overalls or shop clothes and hang the checks upon it. The checks can be removed or replaced with either hand, so that the other one is left free for carrying the tools.—C. C. Spreen, Detroit, Mich.



Scaffolding without Nails

On a repair job where the scaffolding could not be attached to the side of the

Brackets for Scaffolding Supported by Long Braces Reaching to the Ground are Found Useful on Repair Jobs

house, and it was not desired to build up a whole structure from the ground, a contractor designed a number of brackets, which enabled him to get at the work conveniently and safely after very little preparation. The brackets were made of 2 by 4-in. scantlings, each brace consisting of two pieces nailed together so that the central portion, where the greatest stiffness is required, is full 4 by 4 in. The braces fit snugly into the brackets, and the whole scaffolding can be removed in a few minutes and carried to another job.—W. K. Crosson, Detroit, Mich.

Keeping Brushes Soft with Paraffin

Keeping paintbrushes soft by placing them under alcohol, turpentine, or other such liquids, is a somewhat expensive method, especially when the brushes are to be out of use for long periods. If a brush which is still moist with paint or shellac is dipped in melted paraffin several times, so that a heavy coat of the paraffin adheres to it, the brush will retain its softness indefinitely, the paraffin preventing any evaporation. To remove the paraffin, merely pull it off; it will come easily, leaving the brush as fresh as when the paraffin was applied to it.

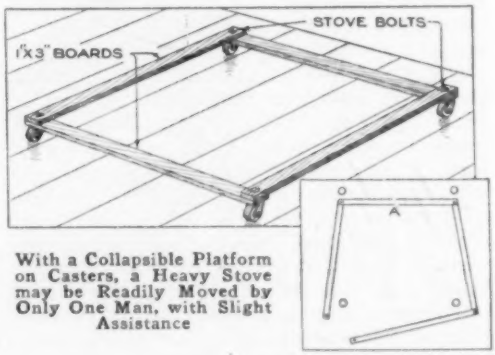
Keep the Lamps Clean

A simple explanation of a gradually failing light in many shops is to be found in that lamp globes and shades are not kept clean and, therefore, do not transmit or reflect the light properly. A little attention to keeping the lamps clean will often enable a shop to avoid the necessity of installing more lights or to have much better illumination with those already installed.—William Philip, Bloomfield, N. J.

Small Truck Aids in Moving Stove

Here is a device that is cheap and easily made, and will enable one grown person, with the help of a child, to move quite a large stove. The frame, of strips, 1 by 3 in., is bolted at three corners with ¼-in. stove bolts, and casters are fastened beneath with screws. In the fourth corner the bolt is first put through the upper board only, and the nut put on to hold it firmly in place. The platform should be made the proper size so that the stove legs may rest on the corners right over, or slightly to the inside of, the bolts. If this is not done there will be some trouble in putting the stove in place.

To use, have the loose corner open, and place the frame near the stove legs. Tip the stove forward so that the strip A may be put into place beneath the back legs. Then, lifting the front, draw the frame together and into position. The bolt in the top strip should drop into the hole in the lower one, and be fastened with a nut. Now the stove may be wheeled into the exact position desired, and by reversing the directions given above may be quickly unloaded. It is better to load the heavy end first and unload it last. Through the summer it will do no harm to let the stove



With a Collapsible Platform on Casters, a Heavy Stove may be Readily Moved by Only One Man, with Slight Assistance

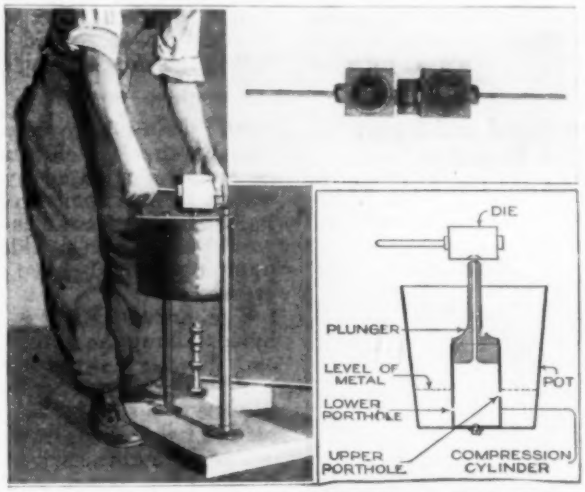
stand on this truck. The casters should turn readily in any direction. Good ones can be purchased at five cents each.

A Homemade Die-Casting Machine

By C. M. MAHOOD

ONE of the interesting processes which have been introduced recently in quantity-production factories is that of making quite accurate finished castings without machining, by the process known as die-casting. In this process, the melted metal is forced into dies under pressure, and after it has cooled, the dies are opened and the finished castings removed. It is thus possible to cast parts which have the "particular" dimensions accurate to the thousandth of an inch, or even less. The metals used are alloys of fairly low melting points, as it has not been found practicable to make dies which would stand up under the temperatures necessary for casting iron or steel.

While die-casting is more particularly a factory process, yet, for certain jobs, it is entirely possible to use to advantage some methods of die-casting in the small shop. Whenever a considerable number of small parts have to be made which do not have to be of great strength, but should be accurate, the method of casting the parts directly to the finished shape should at least be carefully considered.



A Die-Casting Apparatus for the Home Shop: To the Left is Shown the Method of Making the Castings. The Smaller Photograph Shows a Type of Die for Casting Disks, and the Sketch Shows the Construction of the Apparatus

The apparatus herewith illustrated, which is almost entirely homemade, enables anyone to apply, in a somewhat crude way, the die-casting process. An ordinary iron kettle forms the pot in which the metal is melted, while two pieces of ¾-in. iron pipe, with two caps and two floor flanges, form the uprights which support it. These are set up and given a coat of stovepipe enamel. If the metal used is one having a fairly high melting point, so that the pot becomes excessively hot, a sheet-iron jacket may be placed around it, extending to the floor and inclosing the gas burner, gasoline torch, or other means of heating.

To the bottom of the pot is riveted a steel cylinder, which has an inner surface quite accurately machined. An old automobile cylinder, if not too badly worn, will serve, and the plunger may be made from the automobile piston, or machined from a very simple iron casting. The plunger is suspended by a wire loop tapped into it just beside the stem, and a cord runs from this loop to a lever, at the other end of which is a spring for the purpose of counterbalancing the plunger and automatically raising it, so as to clear the upper porthole. This hole, or slot, is about 1½ in. wide and ¼ in. high, and forms the main entrance for the metal from the surrounding pot. The level of the metal should be kept just above this porthole. A small porthole, about ⅛ in. in diameter, is also made near the bottom of the cylinder. Up through the stem of the plunger runs a ¼-in. hole, and the top of the stem is turned off to fit any standard countersink, which will be used in countersinking the sprue hole in the dies.

The dies are made in any of several ways. If one wishes to go to the expense of getting a high-quality die for long service, it can be ordered from a commercial die sinker. For certain types of parts, the die can be made by pouring out two pieces of cast iron and fitting them with dowels and wooden handles, and finishing the die inside with plaster of Paris. Such a die is readily made and is useful for short, rough runs.

The operation of such an apparatus is as follows: Fill the pot with metal to a height slightly above the upper porthole, and heat the metal to 100° or 200° F. above its melting point, in order to offset cooling in the stem of the plunger. Heat the die with a blowpipe flame before making the first casting; after the run is started, the die will be sufficiently heated by the hot metal, and in the case of large parts may even have to be cooled somewhat between operations. Lubricate the

die with beeswax; then close it, place it on top of the stem, with the end of the stem in the sprue hole, and press down upon the handles of the die. The metal will be forced into the die by pressure sufficient to form it for fairly accurate work. Remove the die at once, and as soon as the metal has had time to cool, open the die, throw out the part and proceed to make the next one in the same way. For small, thin parts, the time required for solidifying the castings will be found almost negligible, and the parts can be made as fast as the die can be closed, opened, and pressed down on the stem of the plunger.

As the plunger comes down, it at first forces metal out through the upper porthole; when the lower end of this is reached, the metal is forced upward through the stem. To prevent too great a shock when the main porthole is suddenly closed, the ⅛-in. hole is drilled farther down, which has the effect of diminishing the suddenness of closing the main porthole. The slight amount of metal which will flow out through this lower porthole will not prevent the flow to the die, as the action must be rapid.

Metals for this process are of various composition. Tables of alloys, having various properties, can be found in mechanical handbooks; the cheaper metals are those having a lead base, and have very little strength, though they are entirely practical for some purposes. The metal known as stereotyper's metal, composed of lead, tin, and antimony, melts at about 550° F., and is a useful metal for this class of castings. Where a harder product is desired, alloys with a zinc base and from 10 to 30 per cent each of copper and tin may be used. Shrinkage also varies for these different metals; that of the alloy used should be carefully ascertained before making any accurate die.

Pumps of Centrifugal and Screw Type Work Together

Tests of a well showed that it would furnish a large amount of water, but that

The Screw Pump Raises the Water to the Surface, and the Centrifugal Pump Then Takes Hold and Throws it Up to the Storage Tank

a heavy lift would have to be overcome to get the water to the surface, when it would have to be lifted an additional 50 ft. into a large storage tank.

It was clear that for such a heavy head, a centrifugal pump would be best. On account of the limited suction capacity of such pumps, however, it was also evident that a deep and expensive pit would have had to be built.

On the other hand, one of the new type of screw pumps, made to fit the casing of the well and sunk below the suction limit, would plainly have been indicated but for the fact that the efficiency of such pumps is greatly decreased by a heavy head of water. The expense of the pit, with all its attendant troubles and annoyances, would have been avoided, but the cost of pumping would have been greatly increased.

The owner finally solved the difficulty by installing the screw pump in the well and directly connecting it at the surface with a horizontal centrifugal pump, placing the two side by side and running both off the two pulleys of his engine.

The outcome proved him right. The load on the screw pump is relieved, before the water reaches the surface, by the centrifugal pump, which lifts it from there on the additional 50 ft. into the tank, and the centrifugal pump does not have to exert its limit of suction to take in the water.—Henry Simon, Laguna Beach, California.

Staining Wood a Dark Color with Roofing Cement

When a dark-walnut flat finish is desired on woodwork, one may use the cement which is furnished with rolls of composition-roofing material. To use this cement for a stain, work it sparingly into the wood with a lintless cloth, or small varnish brush; if any surplus cement remains, take it off with the cloth. The results obtained with this novel staining material are declared to be very satisfactory.—H. K. Capps, Stahl, Mo.

COMMENT AND REVIEW

[These pages were printed December 20th.—Editor]

The Aeroplane Mail

A LOT of progress has admittedly been made in the world in other than post-office affairs, since the day when the old stage and its six-in-hand lumbered up to the tavern with its passengers and—important event—the mail. The mail is the one big lottery approved alike by church and state, and in a way, mildly satisfies that spirit of gambling which seems inert in even the most correct, for one never knows what may come next—a bequest or a bill.

The history of letter carrying has always been an interesting picture. It starts with the solitary messenger, on foot, braving the dangers of wild animals and wild men. Then the mounted courier, first a plodding horseman on an indifferent beast, and later a regular Paul Revere with frequent relays of fresh, fleet horses. Next the stage with its impressive function, whose arrival was really an event. From stage we diverge to steamboat and railroad train, and some look forward to a near future in which even these two shall converge in those swift vehicles of the air which are hoped to leave behind all previous carrying agencies as a mere speck on the horizon. Ever since that British airman carried a piano as ballast from somewhere in England to another somewhere in France, anything short of moving a house via the air route seems possible.

The service is so new and inexperienced, however, we should not be too impatient of immediate results, for obviously a general's important orders which must reach a distant point regardless of danger to life or loss of machine, if only minutes can be saved, is quite a different proposition from the great bulk of business and personal correspondence which can already be transmitted between points a thousand miles apart in as many minutes by telephone or telegraph as an aeroplane would require hours to accomplish.

Mere business documents will never warrant the peril to life and limb which is an accepted risk in warfare.

The few attempts with long-distance mail planes which have been made during the past 30 days suggest the need of considerable perfecting of air craft before a regular, dependable air service is possible. The attempted flight from the Pacific coast to Washington with only two scheduled stops got no farther than Arizona, while the attempt to start daily planes simultaneously from New York and Chicago was a complete fizzle: In each case the mail eventually was brought by railroad the second half of its journey, and consumed from twice to three times the time it would have made on a fast mail train. To accomplish even this, Carl Smith, a balloonist and aviator of 11 years' experience, was killed, and his machine wrecked. Other aviators were injured, and machines damaged.

In our impatience of results we are apt to lose sight of the fact that air travel will always be handicapped by storms and air conditions which do not seriously interfere with either a railroad train or a steamship, both of which have a substantial body on which to travel. An express train can reduce its speed and still proceed, a ship can reef its sails, or lessen its speed, and yet make headway; but an air vehicle cannot drop below a certain minimum speed and remain afloat. In the present stage of the art, the high-speed gas engine, the only present available power for planes, is not only a delicate machine, but very sensitive to atmospheric changes, and the present type of the strongest planes requires favorable conditions for rising and landing, and even for flying. Only a day or two ago a naval hydroplane rising in a fog collided with the top of a clubhouse. However, all these are incidents usual to development of a new idea, and already several successful flights have been made by compass—one of 407 miles—and long-distance flights would probably be made at high elevations to avoid clouds and treacherous earth currents.

Until a dependable night service is possible, there would seem little present advantage to business interests in an air mail service which requires nine daylight hours, for at present air mail between New York and Chicago must be posted either long before, or received after, business hours. Both the 18-hour trains, in service for years up to the war, and the present 20-hour trains, are far more serviceable, for a letter leaving New York at noon reaches Chicago at

9:15 a. m. the next day. Allowing one hour in which to deliver and two hours for reply, the answer leaves Chicago at 12:20 p. m. and reaches New York at 9:45 the following morning: a total of less than 46 hours, against 72 hours business time required by air service—unless letters are to be written and posted before six o'clock in the morning.

With the return of peace and the opportunity to develop the plane under conditions of deliberate experiment, the same spirit of inventive genius which evolved a heavier-than-air machine, can be counted on to perfect it. There will naturally be some days in every year in which no plane can navigate, just as there are now some days in which trains are stalled by snow or water, but a few unusual storms do not constitute the average weather, although there probably would be more such days for planes than railroads.

The perfection of planes in the next few years will be one of the most interesting features of a lifetime. In the meantime we must not demand nor expect too much.

There are those among the British aviators who predict that air travel will broaden and soften the minds of men as no other form of travel has, or can ever accomplish. Seen from the sky, the rapidly passing panorama below reveals great cities as mere spots, and vast railway systems as the faint lines of a spider's web. Large lakes become ponds, and one country blends into another in that harmonious whole which the Creator intended. Under these impressions the ego of the individual, and the petty selfishnesses of the human mind, fade into insignificance before the grandness of it all, while a vision of the millenium steals upon one's consciousness.

Sinking the Fleet

THE daily papers have made some quite readable copy of late out of the rumor that to avoid jealousies and heartburnings among the allies, it was urged that the surrendered German fleet be conducted to the location of some mile-deep hole in the ocean, and be inducted thereto as the safest means of avoiding disrupting disputes. It may be a very pretty piece of sentiment which would consign a huge navy at one swoop into honorable oblivion—it savors somewhat of the long-observed tradition, wherein honor demanded a perfectly capable and able-bodied captain to go down with his ship. Such a brave burial would be very pleasing—to the Huns, to whom the whole scheme may be fairly credited. If they had to lose their navy, naturally they would "despise" to see their victors adding it to their already large fleets.

The conduct of the German navy throughout the war has been one huge joke. Its stage entrance had been so brilliantly worked up, the world was prepared to witness something really formidable. In the first few weeks, owing to advance information of when the fatherland would be called on to defend itself against invasion, a few German cruisers and armed merchantmen did make some havoc among unarmed freighters. 'Twas a noble, brave conquest, inasmuch as the first intimation the helpless victim had that a war was on, was when it found itself all shot up and sinking. The English and French saw to it that this performance didn't last long. For two or three years the Bernstorff grapevine brought at intervals the news that the German grand fleet was getting up steam to come out and annihilate everybody. But the British were too many, and the one time a few German war craft stayed out late at night, the alert Britannia licked them so hard the escapade was never repeated. Still the rumors were kept up. It is doubtful if the British had any real hopes of a naval combat the last 18 months of the war.

Never was there such a complete naval surrender since Noah abandoned the world's entire merchant marine. Pompey lost a lot of galleys and Anthony his fleet, and the loss of the Spanish Armada was the sensation of the century, but never anything like the surrender of the German fleet. They were so peeved over the outcome the surrendered vessels were turned over in a shockingly dirty condition, than which no greater crime is possible in the eyes of Jack Tar.

And now they would like to see a grand sinking. Of course they would, and of course they won't. The allies can be trusted for a perfectly satisfactory division; in fact, the truth is, probably none of them would feel very bad if the entire fleet were to be turned over to the British as trustee for civilization, to

maintain and administer in the cause of righteousness. The other allies would still have the benefit of its protection without the cost of its upkeep.

The sinking of the German fleet is a fairy tale like the Holy War, and the Revolt in India, and a few other things which are almost forgotten. The incident has its value, however, in reminding us the Hun is still running true to form as the same sly, intriguing old trouble maker as of yore.

Disarmament, partial, or by the slow process of depreciation without replacement, may not be seriously considered at the treaty making. It would be too much a case of dismissing the shepherd before the wolves were toothless. The allies, as comrades in arms, have found and proved how successfully, and agreeably, they can work together. If, henceforth, diplomacy by this combination of powers, can only be conducted in the open and with the joint knowledge and advice of each of the others, no other combination can stand against them.

In the interests of universal peace it may be safe to discontinue further increase in the navies of the allies, as long as no other nation builds new warships. In 15 years the navies of the world would thus become obsolete.

Waiting for the Treaty

TO the world at large the cessation of hostilities was almost as great a surprise as was the breaking out of the war. In official circles, the end was confidently counted on for several weeks before it was accomplished. So engaging of every effort of mind and hand was the prosecution of the war, there seemed little haste for thought of what the final settlement shall include.

No problem which has ever engaged a congress of nations compares with the responsibility and magnitude of the work before the Peace Commission. Like all great bodies it appears to move slowly, but in due time, like a huge ship, it will cast loose, get under way, and start on its voyage. What its destination will prove to be is of momentous importance to every human being on this earth, and to millions yet unborn. Its importance politically and socially is so far beyond anything in the past, that historically it may almost rank with those great upheavals of Nature in which our Earth was born.

That the men, upon whose shoulders rests the formation of a right and lasting settlement, realize their responsibility, may be accepted.

The countercurrents of wind and wave of suggestion which reach us, indicate the careful approach of the actual negotiations, and give hopeful promise of sane and safe decision.

The whole affair is so vast, and its interests and dependent interests so many and far-reaching, the undertaking is something like the ministrations of relief and reorganization which immediately follow a great flood or conflagration. However, as in those disasters, each day tends to bring order out of chaos, although at first progress may seem slow.

In this effort the best minds of the world are enlisted for its solution, and, it seems, with generous harmony of purpose. The effort of the Huns to throw monkey wrenches in the gears has thus far only bruised their own hands.

To those of us who demand the personal punishment in the persons of the chief offenders—which should include all of us—the sheriff seems a bit slow in arresting the criminals who have already been indicted in the court of world opinion.

In the meantime it behooves us to keep the faith, and, because the gas and liquid fires are no longer being hurled at ourselves and the allies, not forget the spirit of arrogance and hate which conceived them. Not one single repentant word has come out of Hundom. On the contrary, the spirit of defiance burns as brightly as ever. Ever and anon appear allusions to "the next war," while in an appeal to the allies, Eisner says:

> "We do not come to you in sackcloth and ashes, doing penance. We come as men, conscious of having cleared away the old system. We come with pure hearts. That is why we remind you that we are 70,000,000 human beings who want to live, and that it is your duty to forget and to help us reconstruct the new world."

We may be more forgetful as a nation than we should, but with our wounded and dying reaching our shores by the shipload, with thousands more to come for months, we resent being told it is our "duty to forget"—and it will be noticed we are not asked to "forgive."

What we need to guard ourselves against is the danger of relapsing into indifference to the crimes and horrors which the Huns inflicted on humanity.

Even now the Hun in our midst is rapidly resuming his attitude of arrogance and insult to our flag; cautiously, but none the less deliberately. Ships already are afloat headed this way with cargoes of German-made goods, stored for years in neutral (!) European countries, whose value runs into the millions of dollars in a single cargo. German agents already here are taking orders from merchants, who are either pro-German or whose lust for gain absorbs their honor. The moment the gates are open Hun salesmen will swarm over here, prepared to sell goods at a price at which no American workman could produce them and live. Merely for their own protection, the American workmen, of all citizens, should refuse to buy goods made in Germany.

Having time and again proved themselves intriguers; deceptive, barbarous, liars, defilers, why should we open our gates to such a people? Of course, there must be some there who are not so black, but it's dangerous to empty a bag of snakes in the room because a few are probably harmless. It would be a righteous expression of our abhorrence of Hunism not to admit for residence here, for the period of at least five years, any emigrant from what was Germany or Austria. It would be more convincing of our opinion of Kultur than the exacting of any possible indemnity in money—which they would proceed to make out of us and pay us with our own gold. Nor must we relax in our attitude toward those flagrant offenders—those already interned. They must be tried and, if guilty, convicted, and no foolish sentiment should plead for them "the war is over."

The war is NOT OVER in this country as long as one single voice is raised against our flag, our institutions, and our high ideals of right and wrong. These offenders cannot understand these ideals because the noise of Kultur has been dinned into their ears in the cradle, in the school, in the home, and in the church, until they simply cannot hear the clanging of the Liberty bells.

We should abolish in this country every school, private, public, or Sabbath, conducted in any language but English. When the Pilgrim Fathers landed they thanked God for freedom in the English tongue. When the minutemen fought for liberty, they spoke English. When that greatest of all human documents, the Declaration of Independence, was framed, it was written in English. The "Star-Spangled Banner" and the "Battle Hymn of the Republic" were written in English. The English language has been the language of freedom, and opportunity, and self-respect, and deliverance from oppression, throughout this broad land all these years. If this country is good enough for foreigners to leave their homes across the sea to make their home here, our language must be good enough for them to speak, and we should insist on it. I would make it a condition for an emigrant to land here, that every member of the family over eight years of age must be able to speak English "so you can understand it" unless he was dumb or tongue-tied. I would decree that after the year 1920 no announcement, pamphlet, or periodical, should be in any language but English.

Our boys in France, with utter devotion to their country, have carved for themselves such a high place in history, the very least we who remained safely here at home can do in their honor, is to humbly and unceasingly maintain their standard of loyalty and patriotism, and never let it fall from that exalted height to which they raised it.

The Light That Failed

ABOUT five years ago tons of medals were struck off to commemorate the expected entrance into Paris of a German "war lord." The plans for the grand induction were complete to the most minute detail, and called for a show of splendor and armed power second only to the pomp and glory of the days of the Caesars. The pink of the German army with glittering arms and helmets, thousands upon thousands of them, were to grace and guard the boulevards for miles. All the equipment and panoplies of war had each its appointed place in the procession of division after division, which were to march to Hunnish music while dejected Parisians wept in an agony of fear and disgrace. At the head of this vast multitude of conquerors was to ride the war lord himself, surrounded by hundreds of staff officers in magnificent uniforms, while from public buildings and housetops floated defiantly

the flag of two eagles, and the bells of Notre Dame led the wild clamor of spire on spire.

And after the ceremony of occupation . . . . .

All this was planned with the most careful detail and confident assurance.

The grand entrance to the city of Paris was made a few days ago. Soldiers by thousands lined the boulevards, as planned, but they were French and allied soldiers.

Flags waved from every public building and housetop, as planned, but they were chiefly the flags of France nestling close to a simple flag composed of stars and stripes.

The head of a Great Nation was being conducted with simple honor to receive the Freedom of the City. He wore no uniform; he was dressed in the somber garments of the civilian. He did not ride a bespangled steed, he had no dazzling retinue of staff officers. He rode in a modest open carriage, drawn by a single team of horses.

All Paris and some of France was there. The people lifted up their voice, but it was the spontaneous voice of gratitude; tears fell from many eyes, but they were tears of gladness; and the bells of Notre Dame rang out, and the other bells, but they were eloquent with joy.

The children threw missiles at the stranger, but they were garlands and bouquets of fragrant flowers.

"Der Tag" had at last come, but NOT as planned.

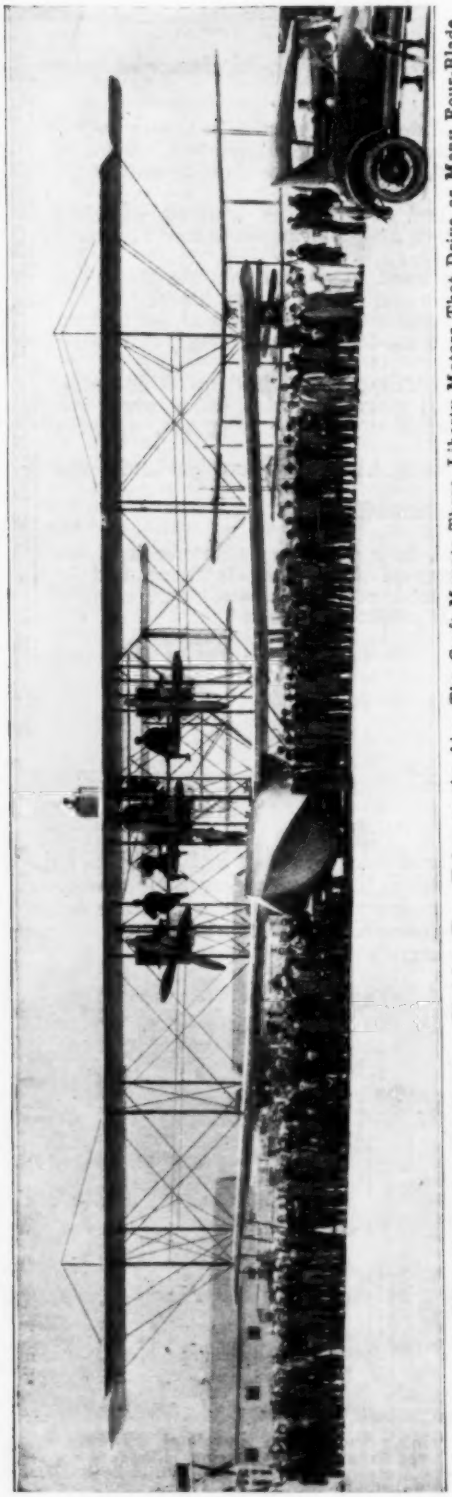
And at that moment, in far-away Holland, to a voluntary prisoner in a reluctant sanctuary, the wires brought the tidings of the Grand Entrance, and as he who was once the haughty, heartless war lord, read the news, there came a far-away look into his eyes as he murmured, "It might have been."

H. H. WINDSOR

MINERS BY STRANGE CHANCE FIND RICH OIL FIELD

Two prospectors, operating a placer mine in California, were dismayed one day not long ago to find the spring dried up from which they obtained water. However, holes drilled near by started the water flowing again, and to increase the flow they bored into the hillside 20 ft. This gave them enough water to resume operations. On returning to work the next morning, what was their astonishment to find a 2-in. stream of crude oil flowing from the bore. A dam was hastily built to conserve the oil until pipes could be laid to a near-by town. Later, bores were driven 60 and 150 ft. into the hill, and now the flow is 100 bbl. per day. The oil is light, with very little water. In the temporary reservoir which the miners constructed, about 2,000 bbl. of oil accumulated.

Temporary Reservoir Containing About 2,000 Barrels of Oil, Which Is Only Part of What had Flowed from the Neighboring Hillside Since the Day When Two Prospectors Accidentally Struck Oil While Drilling for Water to Resume Their Mining Operations



Bow View of the "NC-1," the Greatest Seaplane That has Ever Taken to the Air; The Craft Mounts Three Liberty Motors That Drive as Many Four-Blade Propellers. One of the Unusual Features of the Ship Is Its Modified Conning Tower, Located in the Middle of the Top Plane, which Serves as a Lookout Post for an Observation Officer

AMERICAN BOMBING SEAPLANE CARRIES FIFTY PERSONS

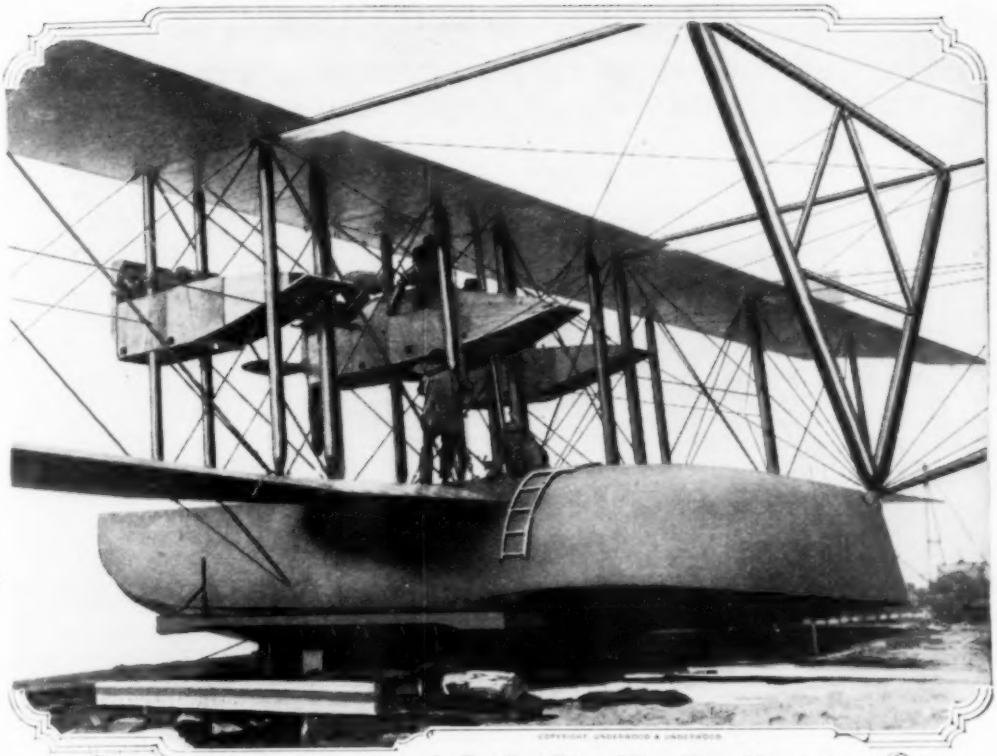
All existing passenger-carrying records for heavier-than-air flying craft were shattered late in November when the navy's new giant seaplane "NC-1" went aloft at Rockaway, N. Y., with 50 persons aboard. This remarkable performance served to center international attention on the latest type of all-American plane, a machine, incidentally, that is the largest of its kind in the world and apparently preëminent in its field for the time being.

The "NC-1" was constructed from plans prepared by the Aircraft Division, Bureau of Construction and Repair. In many respects it is original in design, although it embodies standard ideas. In an official statement authorized by Secretary Daniels, it is asserted that while the craft is not specifically a flying boat, neither is it a seaplane of the pontoon variety. On the other hand, it is described as embodying the most valuable advantages of both types. Contrary to this, however, the vessel bears all of the characteristics of the flying boat, if its appearance, as shown by photographs, may safely be relied upon.

With a spread of 126 ft., of 12-ft. chord, and a boat body as large as a fair-sized launch, the new craft makes a most imposing appearance. It is a biplane with a 12-ft. gap, and mounts three 12-cylinder Liberty motors that drive separate four-blade propellers and generate a total of 1,200 hp. When unloaded and without its crew, it weighs 13,000 lb. Its flying weight is placed at 22,000 lb. Its fuel capacity is 300 gal. In official flights a speed of about 80 miles an hour has been developed.

The pilot's seat is understood to be situated between the two planes in the central "power egg." On top of the upper plane is a modified conning tower in which an observer is stationed. From this position he has a commanding view in all directions. Seats are provided beneath the bottom plane for four other observation officers. Other members of the crew are accommodated in the boat body. The machine is termed a bomb-carrying seaplane and is being used for coast patrol. Others of the same type are understood to be in the course of construction.

It is intimated that the preëminence of this remarkable ship may be of only short life, since Caproni is reported to be building two great planes designed to be capable of carrying 75 and 100 persons, respectively.



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An Excellent Side and Stern View of America's Great New Seaplane is Presented Above. The Picture Well Illustrates the Placement of the Struts That Support the Three Motor Nacelles, Shows the Big Triangular Frame That Braces the After Structure, and Also Discloses the Unusual Arrangement of the Boat's Tailless Stern

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Another Side View of the Big Seaplane Which in a Recent Flight, at Rockaway, New York, Attracted International Attention by Carrying 50 Persons Aloft: It Is This Remarkable Machine That Glenn Curtiss has Proclaimed as Undoubtedly Capable of Successfully Flying across the Atlantic Ocean

ONE MAN DOES WORK OF TWO WITH NEW SPRING SAW

With the aid of a new saw that has lately been introduced, it is claimed that

Showing the Spring Saw, Which Enables One Person to Do as Much Work as Two Ordinarily Accomplish with a Standard Crosscut Blade, in Use. The Top Blade, It will be Observed, Is Toothless

a strong boy or woman is able to cut more wood than two experienced lumbermen equipped with a standard crosscut saw. In support of his claim is the record made during a contest conducted a short time ago.

Two men with a crosscut saw mastered an 11-in. chestnut log in 92 strokes, while one man, with the new machine saw, accomplished the same work in 70 strokes. The implement consists of two steel arms actuated by a powerful connecting spring. A bracket is attached at the fore end of each of the members, and to these the blades are clamped. To operate, the saw is merely drawn back and forth in the usual manner, all of the necessary pressure being exerted by the spring. The entire contrivance weighs only 12 lb. It is especially suited for the farmer who does not wish to incur the expense of purchasing a power outfit for cutting fuel wood. In addition to cutting logs, it may be employed for felling trees of medium size.

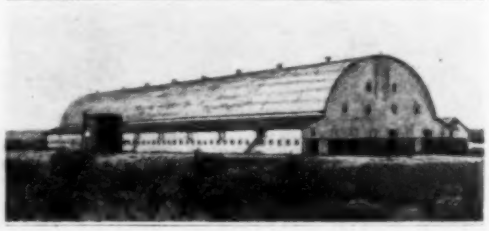
¶Among the novel uses of raw products to which the war has given rise in Europe, is the making of a useful paste from garlic, the preparation of certain fungi to serve as a substitute for cork, and the production from heather of briquettes of high heat value.

GERMANS DEPRIVED LILLE OF MUCH-NEEDED SERUM

Another German atrocity bespeaking the same incomprehensible inhumanity that characterized so many Teutonic acts, has been made public by the head of the Pasteur Institute at Lille, who remained fearlessly at his post during the period of German occupation. He reports that despite his appeals and protests, the Germans took away the last three horses at the institute, which were used in the production of antidiphtheric serum. The fiendishness of the Germans' act is emphasized by the fact that the animals had been declared unfit for any service. The loss of the horses deprived the civil population of sorely needed serum at a time of year when the disease is of common occurrence among children. The Germans' act was a direct violation of international law as laid down at The Hague.

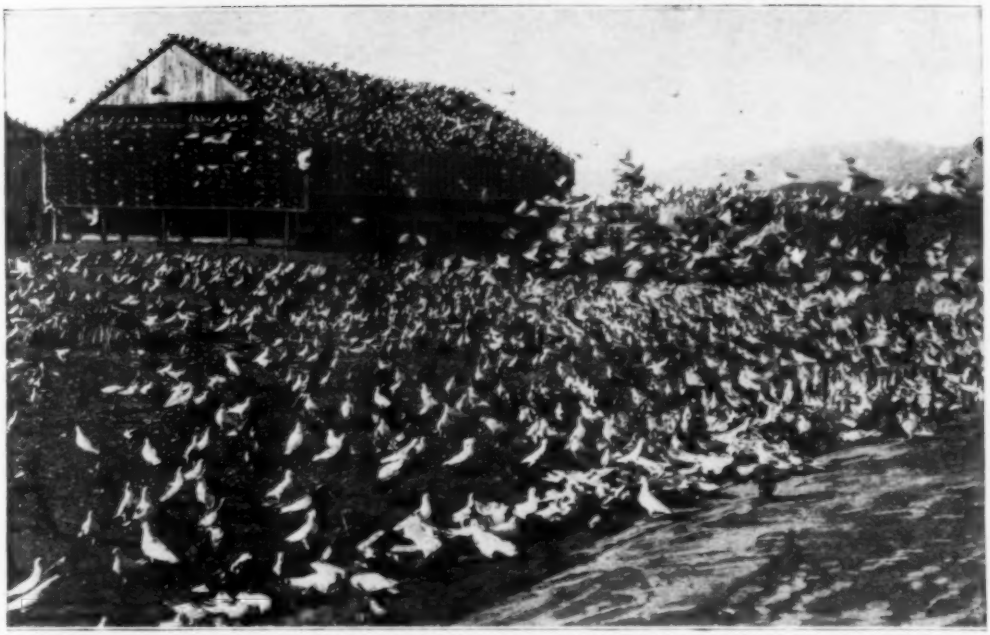
CANADIAN ROUND-ROOF BARN ONE OF WORLD'S LARGEST

One of the largest barns in the world, located at Leader, Sask., is conspicuous for its shape as well as its size, the roof being rounded and forming a great barrel-vaulted loft in which to store produce. The structure is 400 ft. long, 128 ft. wide, and 62 ft. high. The material used in its construction included 875,000 board feet



Barn at Leader, Saskatchewan, Which is Said to Be the Second Largest in the World: It Is 400 Feet Long, 128 Feet Wide, and 62 Feet High

of lumber, 30,000 sacks of cement, 60,434 sq. ft. of corrugated-iron roofing, and three tons of nails and other hardware.



A California Pigeon Ranch, the Home of 100,000 Mature Birds, Which was Wiped Out in a Night by a Flood from a Near-By Mountain Stream: The Feeding Ground Is Now Part of the Bed of a Stream

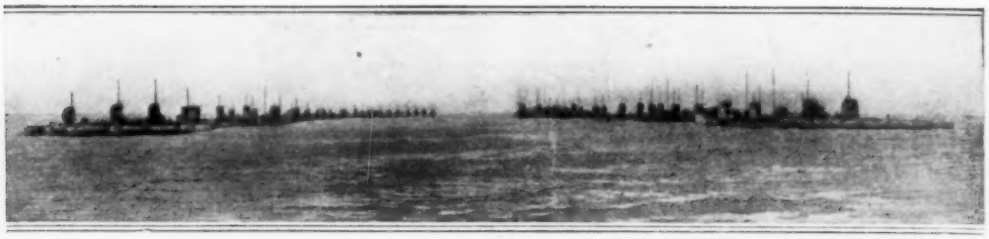
HOME OF HUNDRED THOUSAND PIGEONS WIPED OUT

Formerly California boasted that it had the largest pigeon ranch in the world, no less than 100,000 birds having been taken care of on a tract not far from Los Angeles. But by a peculiar accident, which perhaps has no parallel, the entire establishment was wiped out, the very ground it occupied disappearing from sight. The cause of this misfortune was a sudden flood in a near-by mountain stream which swept all the buildings away, drowned many of the birds, and cut a new channel across what was the feeding ground. The pigeons which survived hovered around the spot for a few weeks or months, but finally scattered in all directions.

FOUR-MONTHS-OLD BABY STANDS ALONE

A Chicago family boasts of a baby which, at four months of age, was a graduate. That is to say, at that age it had progressed sufficiently in a special course of physical training to be able to stand alone and therefore was considered fitted to take up more advanced work. The training of the little youngster, enabling it to stand at four months while most babies cannot do this before they are nine months old, was begun in its third week. One of the first lessons consisted in teaching it to sit up by putting a hand at its back and bracing the tiny feet. At four months it was 23½ in. tall and weighed 11¼ pounds.

Photograph of a Chicago Baby Girl Standing Alone When Four Months Old: Most Babies cannot Do This Before They Are Nine Months Old. An Interesting Course of Physical Training Is Responsible for the Remarkable Feat



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The Striking Photograph Reproduced Above Shows Some of the German U-Boats That Surrendered at the Rendezvous off Harwich. They Are Now in the Hands of Responsible Nations and No Longer a Menace to Humanity

SURRENDER OF GERMAN FLEET GREATEST NAVAL EVENT IN HISTORY

FOUR salient points stand out in the surrender of the flower of the German navy to the allied armada in the North Sea, off Firth of Forth, November 21, last.

Naval tradition holds no parallel of a great sea force ingloriously handing itself over to an enemy without so much as firing a shot. Even the Spaniards, with full knowledge that defeat awaited them, had the spunk to make Sampson win his honors at Santiago.

The German surrender was marked by the most titanic assemblage of fighting vessels ever congregated for any purpose whatever.

By meekly turning over her warships, Germany reduced herself to a sixth-rate naval power.

The United States Navy, without being put to any inconvenience whatever, automatically became the world's second sea power.

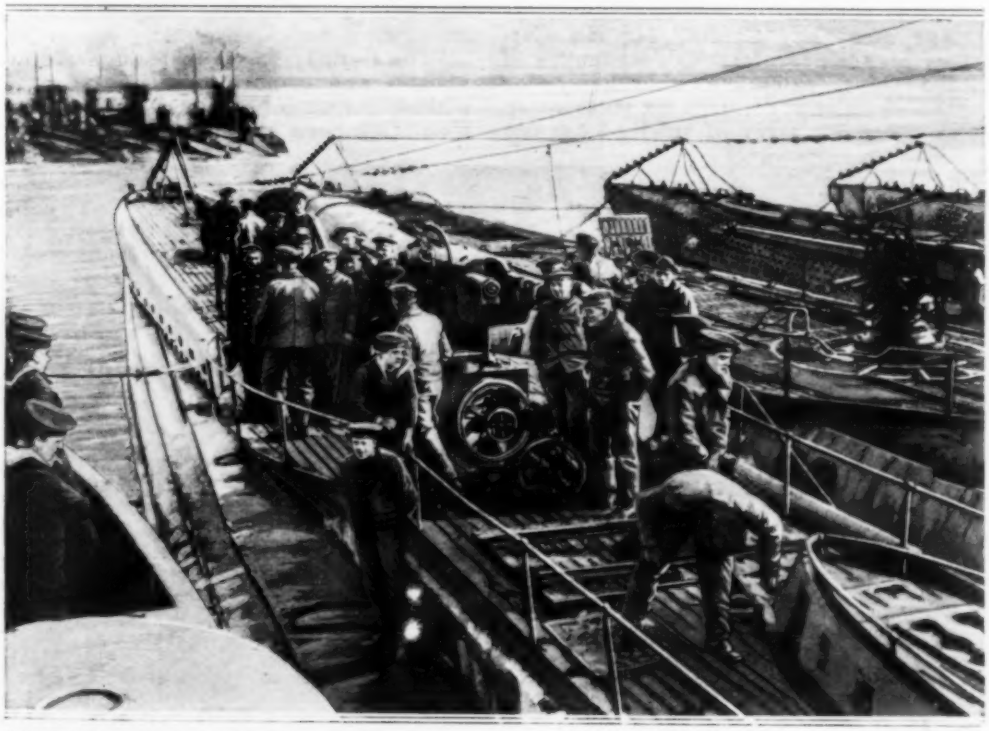
Actual surrender of her fighting ships, in compliance with the terms of the armistice, was begun by Germany on November 20, when at dawn a fleet of 20 U-boats was turned over to five British light cruisers at a rendezvous 35 miles off Harwich in the North Sea. On the morrow the Hun witnessed "Der Tag," for then it was that the first and major installment of the German High Seas Fleet surrendered to Admiral Sir David Beatty, commander of the Grand Fleet. On that same memorable day, the second group of submarines was surrendered off Harwich. From then on, delivery of U-boats continued for some days until the terms of the armistice, which called for six battle cruisers, 10 battleships, eight light cruisers, 50 destroyers, and 150 submarines, were complied with.

How the German navy ignobly struck its flag, once and for all admitting supreme cowardliness to the inexpressible disgust of every red-blooded jack afloat, is known to the whole world. As a matter of record it is briefly sketched herewith.

The conquering allied armada, to which the surrender was made, was composed of about 400 vessels. America was represented by the "New York," flying the flag of Admiral Rodman, with Admiral Sims

At the Rendezvous: Close View of Three of the Hun Submarines after the Surrender. The Crews are Lined on Deck, and an Escort is being Awaited to Convoy the Cowed Murderers to Harwich

Above Is an Interesting Study in Facial Expression: It Shows Sailors from Surrendered German Submarines About to Board a Hospital Ship That Accompanied Them to Harwich and will Return Them to Germany



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Close Deck View of Some of the German Submarines That Apparently have been Escorted to Their Anchorage. Scrutiny Discloses Saw-Toothed Net-Cutting Knives Mounted at the Bow of Each of the Under-Sea Vessels

and his staff aboard, and the "Florida," "Wyoming," and "Arkansas." The French navy was represented by the armored cruiser "Admiral Aube," flying the flag of Rear Admiral Grasset, and two destroyers.

Early in the morning of the appointed day, the Grand Fleet began to weigh anchor at its moorings in the Firth of Forth and form the double line that it maintained throughout the day. Battle cruisers, followed by dreadnaughts, led the way toward the rendezvous some 50 miles distant. The squadron in the northern column was led by the "Queen Elizabeth," Admiral Beatty's flagship, abaft of which the United States vessels took up their positions.

Shortly after dawn the "Cardiff," trailing a kite balloon, was sighted. Following doggedly behind it came the cruiser "Seydlitz," the first of the Hun ships, and four others of the same type in single file nearly a half a mile apart. Then came nine dreadnaughts, led by the "Friedrick der Grosse." The "Grosser Kurgurst" brought up the rear, and three miles aft of it steamed seven light cruisers. The tail of the shameless procession was brought up by 50 destroyers sailing five columns abreast.

The escorting "Cardiff" led the Germans between the formidable gauntlet of allied ships, extending unbrokenly for nearly 20 miles in columns six miles apart. The oncoming array of subdued fighters steamed at the prescribed rate of 11½ miles an hour. Their guns pointed straight fore and aft, they carried no ammunition and they were manned only by navigating crews. The big guns of the allied ships were trained on the enemy, ready to blow her disgraceful navy out of the water if it made a miss move. Every man jack was at his battle position ready for action. Air craft circled overhead, and scores of binoculars scrutinized every inch of each German ship as it came into sight. Men at finders continually corrected the range of the enemy advance. But the Hun was through with his "overt acts," and nothing occurred to mar the complete ignominy of his "place in the sun."

The allied ships put about and formed in squadrons when the far-western end of the flanking lines had been reached by the headmost of the surrendering men-of-war. Steaming westward, the Grand Fleet then began to accompany the Hun to his place of internment, the Firth of Forth. Early in the afternoon the enemy was shown his anchorage.

When the mooring was completed, Admiral Beatty issued the following laconic order, the like of which never before in the world's history was obeyed by a real naval force without a fight:

"The German flag is to be hauled down at 3:57 and is not to be hoisted again without permission." Thus passed the German High Seas Fleet to its ignoble end.

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In View of the Surrender of the German High Seas Fleet, a Certain Amount of Credit Is Due This Gang of Murderers. Most of Them, Surrounding the Chief Thug, Are Former U-Boat Commanders Who Fought Defenseless Ships, but Who at Least "Fought"

The Truck, in Front of Which the Snowplow is Mounted, is Equipped with Runners in Place of the Front Wheels. The Clearance of the Plow is Regulated by Means of the Block and Tackle Attached to the Tall Beam at the Front of the Plow

MOTOR-DRIVEN SNOWPLOW CLEARS MONTANA ROADS

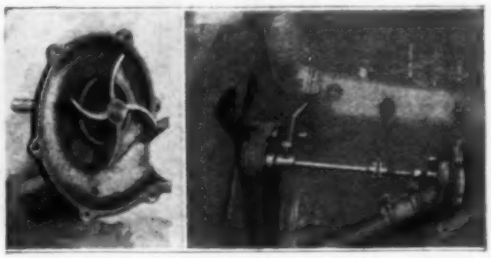
A Montana county engineer has built a snowplow, designed to be driven by a motor truck, with which he believes it is possible to keep the highways open in spite of the heaviest snowfall. The plow is V-shaped and is mounted in front of the truck, which is provided with runners in place of its front wheels. The proper amount of clearance is obtained by means of block and tackle connecting a heavy upright mounted at the apex of the plow, with braces placed back of the driver's seat. Being attached to the truck the plow cannot easily shift sideways.

TRAINING THOUSANDS TO MAN BIG MERCHANT FLEET

Because the United States Shipping Board expects to bring the total number of vessels in its merchant fleet up to nearly 2,000 by the end of 1919, it is most important that a sufficient number of men—approximately 220,000—be available to run these vessels. The permanent facilities for giving instruction along the necessary lines will now accommodate 110,000 men. The institutions are: the Great Lakes station with a capacity for 45,000, Newport and Hampton Roads, 25,000 each, and Pelham Bay, N. Y., 15,000. The first principles of seamanship are also taught on some hundreds of ships which serve as floating schools. A number of institutions are giving courses for training naval officers.

ROTARY PUMP FOR COOLING SYSTEM OF LIGHT CAR

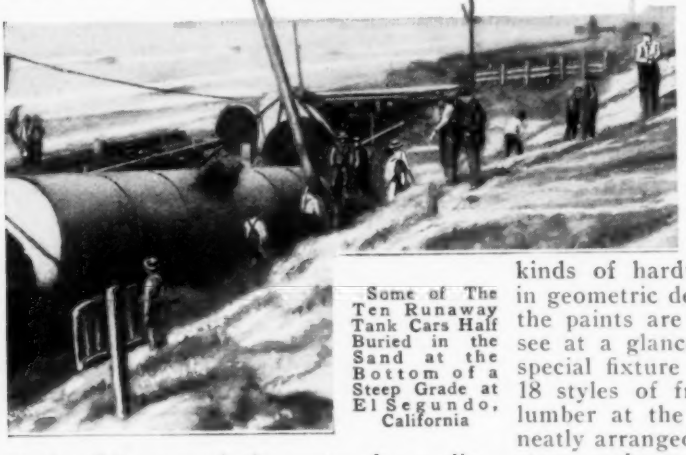
Another accessory for a certain light motor car in universal use, consists of an eccentric centrifugal pump for the cooling system. The device is of current introduction and is especially suited for installation when the car has been converted to a truck or tractor, and is therefore particularly in need of some auxiliary appliance to prevent the motor from overheating. The new pump, which may be attached in 20 minutes without drilling a hole, is complete with stuffing box, grease cups, and fittings. It is driven by the fan belt through a slender shaft with universal joint that compensates for any misalinement that may occur. As an index to its apparent merit, it circulates water at the rate of five gallons a minute, which is rapid enough to prevent freezing, it is claimed, in the coldest weather. The outfit is neatly arranged and takes up but little space beneath the hood.



The Interior Arrangement of the Centrifugal Pump is Clearly Shown at the Left. The Other Illustration Pictures Its Installation

TANK CARS DUMP CRUDE OIL INTO PACIFIC OCEAN

Ten tank cars laden with crude oil rolled downhill at El Segundo, Calif., not long ago, with disastrous results to the contain ers, their content, the roadbed, and adjacent telegraph poles. The scene of the accident was on the ocean front, and upon reaching the bot tom of the grade the runaway cars buried their noses ostrich like in the sand. Oil covered the water for a distance of several miles out from the shore line.



Some of The Ten Runaway Tank Cars Half Buried in the Sand at the Bottom of a Steep Grade at El Segundo, California

LUMBER AND SUPPLIES SOLD IN MODEL STORE

On the theory that system, convenience, and attractiveness can count as much in the lumber business as they do in a well-conducted department store, a concern dealing in lumber, builders' supplies, etc., in Logan, Utah, has opened what is acclaimed a model "lumber store." It is located in the business district and not in a remote neighborhood, as are many lumber yards. The large plate-glass windows are attractively decorated with supplies, and are well lighted at night. The floors within are well polished. Comfortable chairs and a table are provided for those who wish to inspect a large collection of house plans. Samples of all kinds of hardware stock are displayed in geometric designs in wall cabinets, and the paints are so arranged that one can see at a glance the available shades. A special fixture is provided for inspecting 18 styles of front doors. Much of the lumber at the rear is under cover, and neatly arranged. The management of the store seeks to emphasize the fact that they are not merely lumber dealers but home builders.

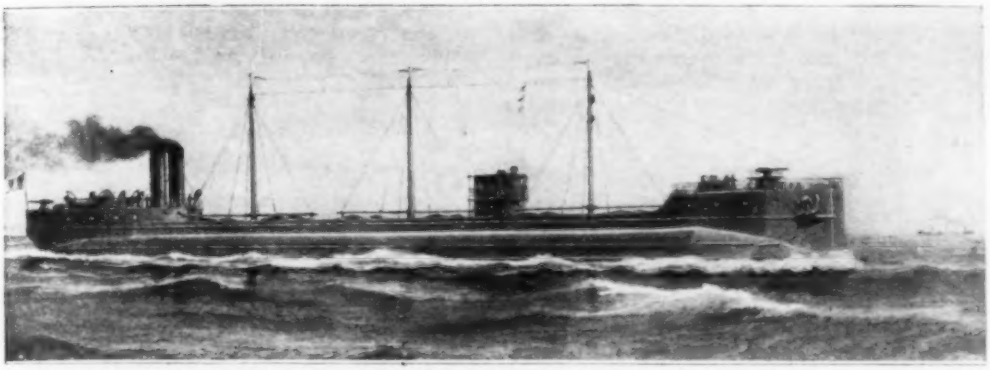
ROTTED POLES BRACED TO SAFEGUARD CLIMBERS

In the work of electric linemen, as in many other trades, each year witnesses increased precaution against accidents. An eastern lighting company, seeing the harm that might result if a lineman climbs an unbraced pole which is rotted at its base, now provides that in such cases four men shall brace the rotted member with pike poles. If this is not done, the detaching of the guy wires, or the conductors, may let the pole fall, seriously injuring the lineman. Whenever it is impossible to provide the necessary men in cases of this kind, the man doing the climbing is cautioned not to use his safety belt, so that he can leap free of the pole in case it falls.

Bracing a Pole, Rotted at the Base, So that It can be Climbed with Safety. An Instance of the Increased Care being Taken by Electric Linemen to Prevent Accidents

¶The level of Lake Nyasa, in southeastern Africa, after falling for several years has now begun to rise. Reports show that in 1917 it was more than 3 ft. higher than two years before.

STRANGE NEW STEEL VESSELS ARE NONSINKABLE



Afloat, the New Nonsinkable Ship Bears Close Similarity in External Appearance to the Whaleback Steamer, Which Is Well Known to Those Familiar with Shipping on the Great Lakes

Within a few weeks, it is expected, the first of a series of five supposedly unsinkable steel cargo steamers of an altogether new type, under construction at New Orleans for the French government, will be launched. According to the present schedule, the initial vessel will be completely equipped and ready for service the latter part of April.

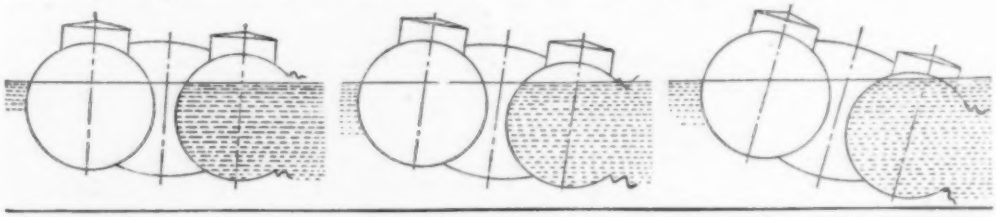
Although the submarine menace fortunately has been overcome, the necessity for a nonsinkable ocean-going ship still obtains. It is therefore interesting to observe some of the details in the design of the new type of steamer in question, which represents a radical departure from standard practice.

The boat is the invention of the naval architect who heads the technical service of the French merchant marine. In external appearance the carrier resembles a whaleback steamer. The likeness is only skin-deep, however, for the cross section of the ship, instead of being of the usual U-shape, is in the form of two circles placed side by side and connected above and below by curved segments.

Two parallel cylinders, 20 ft. in diameter, laid horizontally side by side, and connected by transverse water-tight bottom and deck plates, compose the unusual hull. The latter is stiffened and given protection from flooding by a series of seven water-tight bulkheads, each of which extends continuously from one side of the vessel to the other. Thus a system of 24 separate water-tight compartments is formed, eight in each of the cylinders, and a like number in the "reserve-buoyancy" space between them.

The new ship has an over-all length of 328 ft., is approximately 46 ft. of beam, and has a draft of 16 ft. Its dead-weight carrying capacity is 4,250 tons. The propelling machinery consists of twin triple-expansion, 700-hp. engines, designed to drive the vessel about nine and a quarter miles an hour when it is fully loaded. Scotch marine boilers fired with fuel oil will be used. Particularly interesting is the fact that one complete power plant is to be installed in each half of the divided hull. This arrangement will enable the ship to make port under its own steam, it is believed, even though one side has been completely flooded.

¶Dry pine needles have been used successfully in making brooms and brushes, tests having shown that because of their hardness they wear very well.



The Diagrams Give a Cross-Sectional View of the Ship and Also Illustrate Its Buoyancy. From Left to Right: Two Compartments, One Side, Flooded, Angle Three and One-Half Degrees; Four Compartments, One Side, Flooded, Angle 12½ Degrees; Six Main Compartments, One Side, Flooded, Angle 16 Degrees

NEW ZEALANDER'S QUAINT MILL SAWS DRIFTWOOD

A salvage station as distinctive as it is picturesque has been erected by a man 71 years old, on the beach about four

Odd Windmill, near Gisborne, New Zealand, Made from Waste Materials: It Drives a Saw with Which the Aged Owner Cuts Up Driftwood Gathered on the Shore

miles from Gisborne, New Zealand. It consists of a crude windmill of the Dutch type, which furnishes power for a saw used by the old man in cutting up driftwood. The little mill is covered with squares of tin which once were old oil-cans, while the wooden portions were obtained from a wrecked boat. The gearing, assembled from old machinery, drives the saw at 300 revolutions per minute.

MOTOR CAR "BOMBARDS" BRIDGE, COMPLETELY WRECKING IT

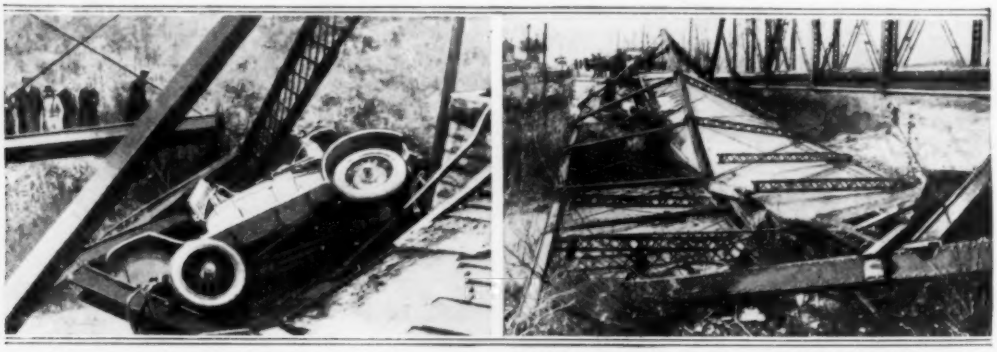
While speeding along the Dixie Highway, near West Alexandria, Ohio, a few weeks ago, a motorist accidentally drove his car with great force against one corner of a steel bridge, snapping one of the girders. Instantly the whole structure, which was 112 ft. long, collapsed as if it had been struck by a well-aimed shell from a big gun. Though the auto landed on the steep river bank amid the wreckage, the occupant suffered only a few scratches.

LIVE WIRE CAUSES DEATH IN STRANGE MANNER

Shortly after a rainstorm not long since a 13,200-volt transmission line in Wisconsin broke and fell on a wire fence. Three barefoot boys, walking along the road near by, felt an electric shock in their feet and two of them ran to a fence which was 60 feet from the one in contact with the transmission line and had no connection with it. One of the lads endeavored to crawl through the fence and was killed instantly, while the other, on starting to crawl beneath the lowest wire, was badly burned. The accident occurred three miles from the power plant, the boys being between it and the broken wire.

PLAN AERIAL-MAIL SERVICE FOR BRAZIL

Steps have been taken to institute an aerial-mail service between the various state capitals of Brazil, a concession having recently been granted to a private concern to undertake the work. Two years is the time allowed to get the service in operation, though the government may extend the period two years longer, if deemed advisable. At the outset, only the delivery of mail and small parcels will be attempted, but later passengers may be carried, and the number of cities served may be increased. The persons holding the concession agree to permit the government's student airmen to use their hangars and machines.

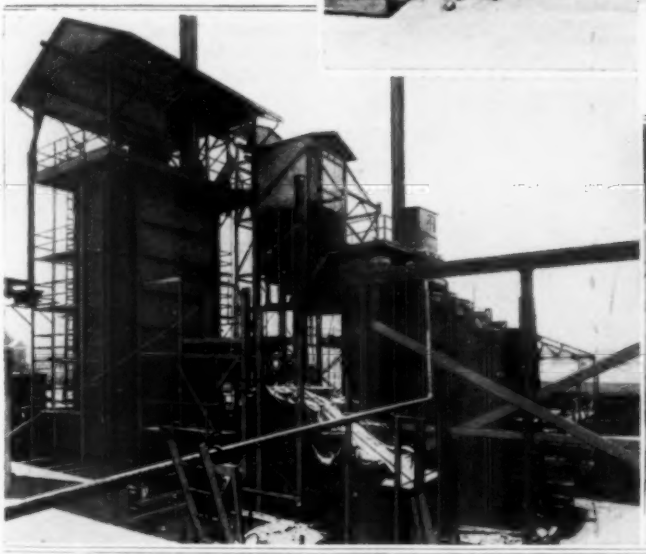


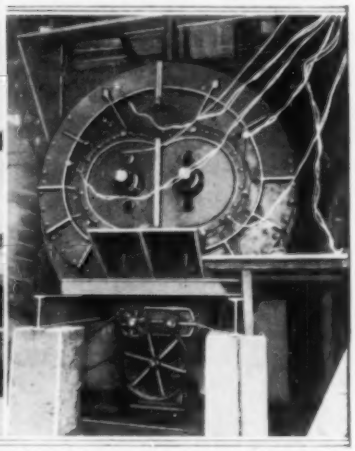
The Overturned Automobile at the Left Lies amid the Wreckage of a Bridge, near West Alexandria, Ohio, Which Completely Collapsed When the Car Struck One Corner of the Structure. The Extent of the Damage is Clearly Shown in the Right-Hand View

BIG CHANGES MAY RESULT FROM NEW-MADE FUEL

Two Briquettes of the New Fuel, One before and One after Distillation, Showing the Saving in Bulk That Results

A Bin Containing the New Fuel Which the Makers Believe will be Used in Preference to Hard Coal in Many Regions Far from the Latter but Near to Soft-Coal Fields





Part of the Demonstration Plant at Which the Production of the New Smokeless Fuel has been Undertaken on a Large Scale is Shown at the Left. In the New Process a Very Large Part of the By-Products is Conserved, Materially Reducing the Cost of the Made Coal. The Discharge End of One of the Furnaces Appears at the Right

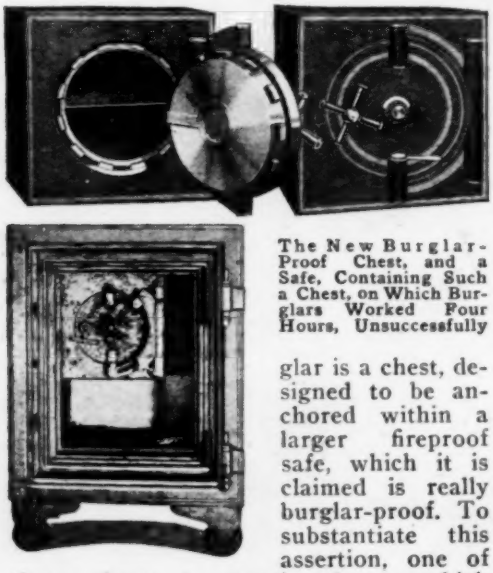
Little short of a complete revolution in the coal business and, consequently, far-reaching changes in American industry, are the results which, it is predicted, will follow from the invention of a new commercial process of converting bituminous coal into an equivalent of hard coal. The new fuel is entirely smokeless, and under the new process by-products now wasted, are recovered. These largely compensate for the cost of conversion. A plant has been in operation in the East for some time, perfecting the process and making tests of a practical character.

The raw coal is subjected to a distillation process at low temperatures, the residue being pressed into hard, durable bricks that are again subjected to distillation and produce an intense heat. If the claims of the large interests already identified with the process prove true, it means that future problems arising from hard-coal shortage have been solved, that in many cases, power can be produced near the coal fields and transported at low cost to large industrial centers, and that cities remote from anthracite regions can procure a smokeless fuel for domestic and other uses, which can be sold at a moder-

ate price. It is interesting to note that the government is preparing to establish a plant for producing this fuel in an eastern coal region.

NEW BURGLAR-PROOF CHEST BAFFLES CRACKSMEN

A product of the safe builder's ceaseless efforts to baffle the most skilled burglar is a chest, designed to be anchored within a larger fireproof safe, which it is claimed is really burglar-proof. To substantiate this assertion, one of these chests is mentioned, on which cracksmen worked four hours, exploding six charges of nitroglycerin on its door without results. The chest consists of a hollow cubical casting that is drill-proof, with a round door. The latter fits so tightly that no liquid can be forced between it and the jamb.



The New Burglar-Proof Chest, and a Safe, Containing Such a Chest, on Which Burglars Worked Four Hours, Unsuccessfully

COMBINATION FIVE-DOLLAR AND TEN-DOLLAR BILL

A druggist in Waukegan, Ill., while counting his money recently, chanced to turn over one of the five-dollar bills and was astonished to find that on the other side it was a ten-dollar bill. Treasury-department men explain the anomaly on the theory that one side of a sheet which had been printed for five-dollar notes was accidentally backed up on the press with ten-dollar note form.

¶An American company has been authorized to make studies for an underground telephone system in Montevideo, Uruguay.

CROSS-ATLANTIC FLIGHT PRIZE AGAIN OFFERED SPORTSMEN

Announcement has been made by the Royal Aero Club of Great Britain of the reposting of the Daily Mail's $50,000 transatlantic-flight prize. The terms of the contest remain the same as in the past. The award will be made to the first airman who completes, within 72 hours or less, a flight between any point in the United States, Canada, or New Foundland, and any point in Great Britain or Ireland. A machine may not alight on land en route, but it may do so on water and likewise halt for repairs. There are a number of machines now under construction in America and elsewhere for the purpose of crossing the Atlantic. There is good reason to assume that before many months have elapsed, an attempt will have been made to accomplish this feat, which would have been undertaken in 1914, except for the outbreak of the war.

FOOTBALL SIGNALS SHOW DOWNS AT A GLANCE

A football coach has patented a signal for use on the gridiron which promises to be much appreciated by players, officials, and spectators, for it enables them to ascertain the downs at a glance. It consists of a rod usually carried by the lineman, near either end of which are four panels forming four sides of a cube. At one end two opposite panels are numbered "1" and the other pair "2." On the other end are panels "3" and "4." During the period of the first down the end of the pole bearing the "1's" is held uppermost, with the proper panels facing the players and spectators. With each successive down the signal is changed accordingly. The rod is collapsible and the numbered panels fold flat, so that the signal can be carried in a small case.

AMERICAN FLIERS USED RADIO-TELEPHONES IN BATTLE

One of the highly important American military secrets that was disclosed upon the conclusion of hostilities, concerned the use of radio-telephony by our airmen in battle. The United States of all the nations at war, was the only one whose air fleets were maneuvered, and whose pilots and observers were in constant communication with headquarters, by means of the spoken word.

Credit for adapting the wireless telephone for aeronautical use belongs to Col. C. C. Culver, who spent 10 years in perfecting the invention. The first that was publicly known of the officer's work was contained in an announcement made at San Diego, Feb. 7, 1917, that Colonel Culver had supervised a successful test of a wireless telephonic apparatus, and that a conversation had been held between a land post and an army aeroplane in flight. Following that, little or no information was given circulation. In December following, however, the first successful demonstration was conducted before the Aircraft Board, and the joint Army and Navy Technical Board at Dayton, Ohio. At that time two planes were used. Those aboard them communicated with each other freely, and also conversed with operators at a ground station. Members of the boards were supplied with receiving apparatus and "listened in" on the conversations, which they heard as distinctly as if the words had been transmitted by wire.

In October, previous to the Dayton test, Colonel Culver sailed to France with experimental sets of the apparatus, and subsequently conducted demonstrations for the benefit of our air forces overseas. Early in the summer of last year several thousand sets of apparatus were distributed among training camps in the United States and dealt out to the expeditionary air forces. Use of the equipment was made chiefly in bombing operations. There is reason to believe that the existence of the system remained a mystery to the Germans until the last, although reports have been circulated that the enemy's aeronautic department did get an inkling of the secret just before the armistice was signed. There is, however, no documentary evidence to support this claim.

Since the conclusion of fighting two interesting demonstrations have been made in this country. One of these took place at Roosevelt Field, November 15 and 19. De Haviland planes were put through evolutions by verbal command. In this connection it is interesting to note that use of the radio-telephone makes it unnecessary for the commander of an aerial squadron to fly at the head of the formation where he can be in plain view.

PHOTOS COPYRIGHT, INTERNATIONAL FILM SERVICE

Above is Shown How Wireless Telephone Transmitter and Receivers are Worn by a Pilot. The Insert Pictures Witnesses of the Demonstration at Bolling Field Listening to Orders Issued by a Flight Commander Aloft

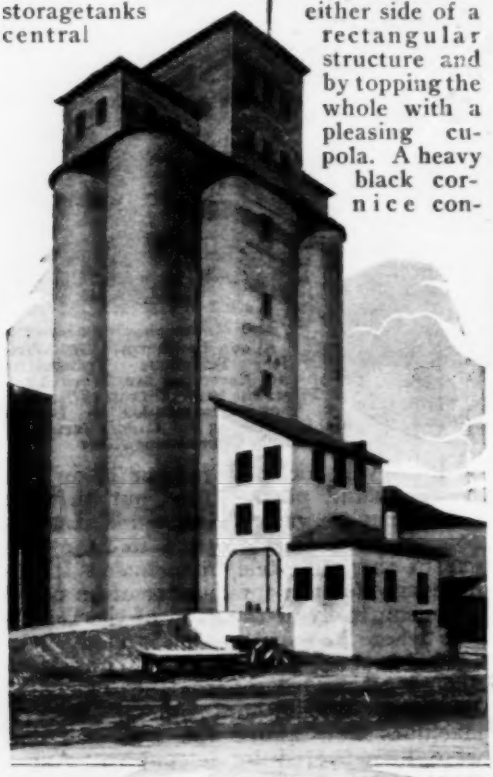
The second demonstration was conducted November 22, for the benefit of President Wilson and others. Several machines flew above the Potomac and were maneuvered by telephone. Apparatus installed at the White House enabled the president and his party to hear the exchange of messages and issuance of orders while watching the planes go through their evolutions with perfect military precision.

It is understood that before the war ended the apparatus had been tried out by British and French air squadrons, but it had not been placed in regular use by them.

Technical details of the invention are yet to be made public. It is permissible, however, to mention a few general features which do not disclose intimate phases of its construction. Perhaps the most interesting point concerns the method employed to prevent foreign noises from interfering with the transmission of messages. Briefly, the secret is this: The apparatus is so tuned as to be affected only by sounds that exceed 200 vibrations a second. This provides for the human voice, but excludes motor, machine gun, and shell noises.

ARTISTIC GRAIN ELEVATOR HAS SPECIAL FEATURES

Lines as pleasing as those of an old-world castle have been incorporated into a modernly arranged and equipped grain elevator of reinforced concrete, recently erected at Ione, Ore., at a cost of approximately $40,000. Symmetry has been obtained by arranging two circular and two semi-circular storagetanks either side of a central rectangular structure and by topping the whole with a pleasing cupola. A heavy black cornice con-



New 100,000-Bushel Grain Elevator at Ione, Oregon Which Is Distinctive on Account of Its Unusually Artistic Exterior, Its Conveniently Arranged Interior, and Its Up-to-Date Equipment

trasts sharply with the white finish of the walls. The ground dimensions are 62 by 33½ ft., and its height is 124 ft., over all. It contains a total of 20 bins with a capacity of 100,000 bu. A special feature is the arrangement of these bins so as to allow an unobstructed floor space of 12 by 33 ft. on the same level as the car floors. The construction is such that the weight of the overhanging bins is transferred to points of contact in the solid slab of concrete beneath the building.

TESTS SHOW AMERICAN SOLDIER TO BE HIGHLY INTELLIGENT

Mentality tests conducted by the Division of Psychology of the Medical Department and taken by approximately 1,500,000 of our soldiers, have disclosed some significant information. More than 26 per cent of the enlisted men who were examined were found to be considerably above the average in intelligence. About 48 per cent of the officers tested were graded as having "very superior intelligence." From eight to 10 soldiers out of every 100 received "B" classification, which is "superior intelligence." From 15 to 18 per cent of the men showed themselves to have "high average intelligence," and 58 per cent of the noncommissioned officers fell into the same group. Only about 11 per cent of the noncoms received as low a rating as "C," which stands for "average intelligence," the rating given 25 per cent of the soldiers. About a fifth of those who were examined received the marking of "C minus," which is the grade for "low average intelligence." Such men, although unfit for leading others, usually make good privates and do satisfactory routine work. Most of the 15 per cent who fell into "D" group, meaning "inferior intelligence," are illiterate or foreign. Slightly over one per cent of the soldiers were found to be of "very inferior intelligence." Most of these have intelligence equal to that of a normal 10-year-old child. Some of them were recommended for discharge and others assigned to the "development battalion. The tests provided a reasonably dependable classification of the men according to their general intelligence. In this manner men of superior intelligence, many of them deserving of promotion, were discovered immediately. On the other hand, the formation of special organizations for work of a nature demanding superior mental strength, was materially aided.

HAWAIIAN ISLANDS SUFFER FROM TERRIBLE STORM

Schoolhouse in Honolulu, Hawaii, Wrecked by Immense Tree Overturned during Tornado

Another View of the School Shown at the Left: Fortunately It Was Empty When Damaged

One of the Streets of Honolulu, Photographed after the Recent Storm, Strewn with Telephone Poles, Electric Wires, and Uprooted Trees

While enthusiastic residents of Hawaii contend that the islands have the finest climate in the world, none denies that the seasons are occasionally punctuated by terrific hurricanes. The accompanying photographs show some of the results of a recent uproar of the elements, which caused damage amounting to hundreds of thousands of dollars. It is said to have been one of the worst storms in the history of the islands. A schoolhouse, fortunately empty, was one of the buildings wrecked.

MOTOR-TRUCK TESTING TRACK BUILT AT DETROIT PLANT

Adjacent to one of the motor-truck factories at Detroit, a 1,760-ft. concrete track has been constructed to facilitate mechanics in putting new machines through the usual road tests. By having a private, paved course of this kind, the drivers are able to watch the performance of their cars more closely than when constantly contending with heavy traffic in city streets, and furthermore are always in reach of assistance when it is needed. It has been found that the track relieves trucks of much of the wear and tear heretofore suffered during tests, and that it also enables them to be kept cleaner.

The Paved Course, Free from Public Traffic, Materially Simplifies the Work of Testing New Motor Trucks, Besides Eliminating Much of the Wear and Tear to Which the Vehicles are Subjected When Tested on Ordinary Roads

Phonograph Detects Wireless Leak

By E. T. BRONSDON

"B-z-z-z-z-z-z-z-z-z-z!"

Buzzing and sputtering, the spark was acting up. The French Intelligence Department, with receivers all tuned up for Nauen and Madrid, could make nothing out of the supposed message.

"Nothing there!" was the verdict of the wireless expert.

Headquarters thought differently. The Germans had known far too much concerning allied troop disposal in the Somme advance. News was getting across constantly; some of it was acted upon by the boches before ever allied troops in advanced positions could know of the changes made. Careful sifting had made a practical certainty of the theory that a neutral country was sending the news by powerful wireless. Further investigation had disclosed that in Madrid, Spain, an instrument was using the same wave length used habitually by Nauen, the great official station of the German empire. A little observation showed further that, at irregular times, both of these stations sent out these queer buzzings. It looked suspicious, to say the least.

For weeks afterward the allies kept experts busy on the strange problem. Every sort of instrument was tried, the theory being that perhaps some special receiving apparatus had been invented which made the buzzing jumble intelligible. The British who were called in to wrestle with the problem were unanimous in the opinion that the noise, which never lasted more than a fraction of a minute, was due purely to some imperfections in the sending stations. No message of any kind, except possibly some code word agreed upon before the war, could be sent in this manner—surely no data concerning the movements of divisions or army corps, for the names of these alone would take more spark than was wasted on the whole of each of these "mystery messages." The French were polite, but unconvinced.

Still the buzzing continued from Nauen and from Madrid, though more often from the latter. The leak, also, was growing worse. It had become so bad that the French organized a phantom attack under General Debeneau. With only that general and headquarters staff in "on the know," three divisions were scheduled to hammer the German front on a certain August morning. Two days previous to the imaginary attack the Germans on this front abandoned three moderately dangerous positions which they had held stubbornly to that time! Patrols sent out to reconnoiter reported a huge force of *stosstruppen* grimly waiting to annihilate the three divisions, which naturally never went over the top.

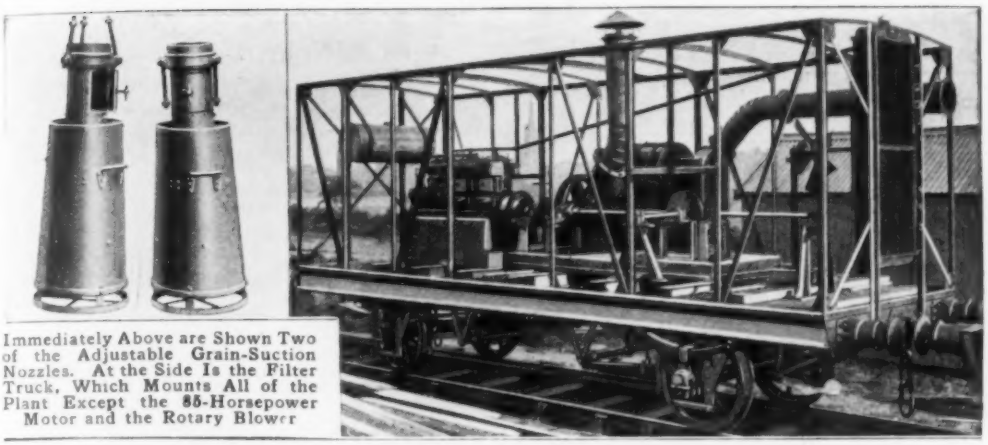
Positive orders went out to "tune up" on Madrid. Obeying this mandate, the Intelligence Department finally discovered the trick. A certain investigator, at his wit's end, attached a phonograph with a blank record to the receiving station which was investigating Madrid. When the buzzing came it was inscribed on the soft wax of a record. This first attempt yielded no specific result, but it furnished a hint. Running the record at two or three revolutions to the minute, several experts thought they detected certain letters.

Immediately another trial was made. This time the blank record was run 300 revolutions to the minute.

The buzzing was caught. When the record was re-run at lower speed the code message was obtained! Then, of course, the problem was simplicity itself; no German ever yet has been able to evolve a code which the French Intelligence Department could not decipher in its sleep. The message, as expected, gave a wealth of details that no German was supposed to know. Soon after, Nauen came through with questions which Madrid would answer as soon as possible.

The scheme really was simple. In each of these stations reels for holding a perforated-tape message had been attached to the wireless sending apparatus. A mechanism essentially like that which reproduces from music rolls on a player-piano took the message from the perforated roll and sent it out in ether waves at from 300 to 400 words a minute! At either end a phonograph picked up the seemingly meaningless jumble, and ordinary steel needles reproduced it.

It is doubtful if the Germans ever found out that the French were on to their scheme, for on occasion, until nearly the end of the war, the device was used. Needless to say there always was a third party "on the line"—and it is certain that none of the information that subsequently went through ever bothered the allied armies. Through various ruses, and through the leading questions asked by Nauen, the French were able to pick up many spies that they never would have suspected under ordinary circumstances, thus closing up most of Fritz's reliable sources of information.



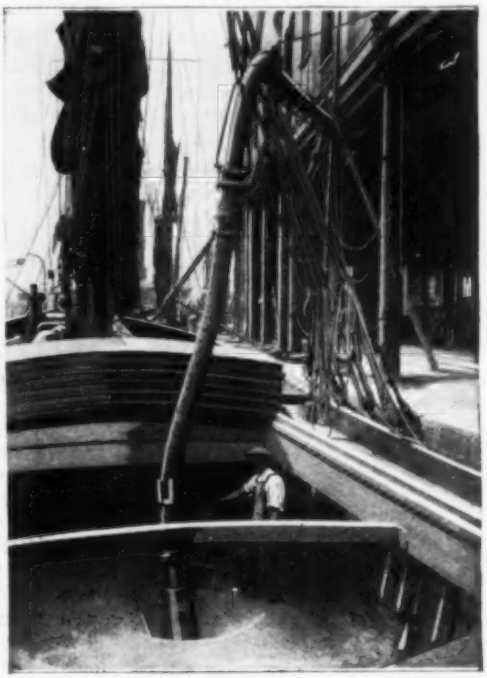
Immediately Above are Shown Two of the Adjustable Grain-Suction Nozzles. At the Side Is the Filter Truck, Which Mounts All of the Plant Except the 85-Horsepower Motor and the Rotary Blower

RAILWAY CARS MOUNT GRAIN-UNLOADING EQUIPMENT

Because of the necessity, during the war, of unloading ships at whatever port they might enter, a novel, portable, pneumatic grain-unloading equipment was developed in England, and placed in use shortly before the conclusion of fighting. In principle the appliance is quite familiar, but its arrangement is another thing. The plant is mounted on two typical English railway carriages and is designed to be dispatched from point to point by rail, as needed. Its purpose is to facilitate the unloading of grain at ports that lack suitable facilities. Grain is sucked from a ship through an adjustable nozzle into the transport line, which consists of 12-ft. lengths of pipe joined together by special couplings. A series of trestles supports the artery between the cars and the edge of the dock, while at different points it is fitted with ball joints to permit changes in position and alinement.

One of the cars is known as the filter truck. It mounts the receiving chamber, into the bottom of which the grain first falls. There the grain enters a discharger, consisting of a bucket wheel rotating within a close-fitting casing, and is fed to a chute that drops it on a band conveyor delivering into the hopper of an elevator at one end of the car. The latter carries it to the dock's weighing truck, which weighs and sacks it. Triple filters, consisting of nests of closely woven canvas tubes, are also mounted on this car. Air in passing to the blower must traverse these strainers and be freed of all dust and foreign particles. The accumulated dirt is trapped within the tubes, from which it is readily removed for weighing, when this is necessary in order to check the weights given in invoices.

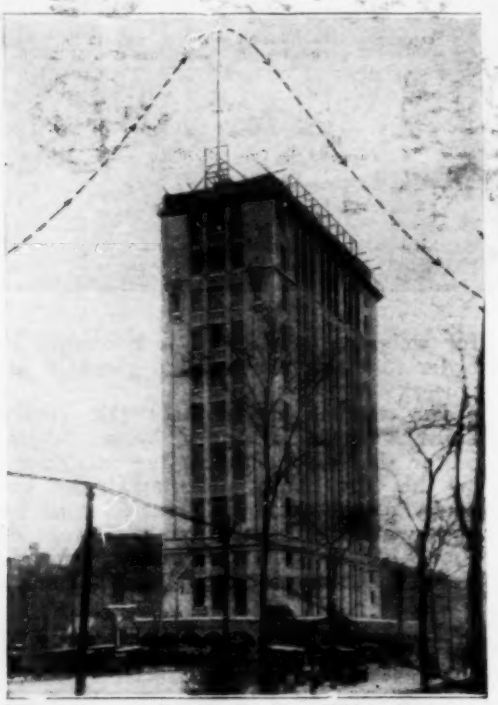
The second car mounts the rotary blower, which is driven by an 85-hp. motor that also actuates the machinery on the first truck. The maximum capacity of the plant is about 33 tons an hour when conveying from a distance of about 100 ft. The fuel consumption is stated to be seven gallons of gasoline an hour.



Unloading a Small Grain Boat with the Portable Pneumatic-Conveyor Plant: The Adjustable Nozzle is Clearly Shown

FLIER KILLED WHEN PLANE STRIKES FLAGSTAFF

While rejoicing in the signing of the armistice, thousands of Detroit citizens filling the streets of their city were thrilled



Flagstaff on a Detroit Building Which Caused a Flier's Death: Dotted Line Shows Path of the Machine, One Wing of Which Caught on the Tip of the Pole

by the daring feats of an airman above them. Several times he looped so low that the throng held its breath until he rose again in safety. But just when the tension was somewhat relieved the flier made another dip close to the trees, and in rising to pass over a near-by building, missed calculations by a few inches. One wing of the aeroplane struck and was torn by the tip of the building's tall flagstaff from which had flown many times the emblem that was being honored by the celebration in the street below. The tear left the wing useless and, turning sharply, the machine plunged its nose into the roof of a structure not far away. The flier, badly crushed, died shortly after, and his companion suffered a broken leg.

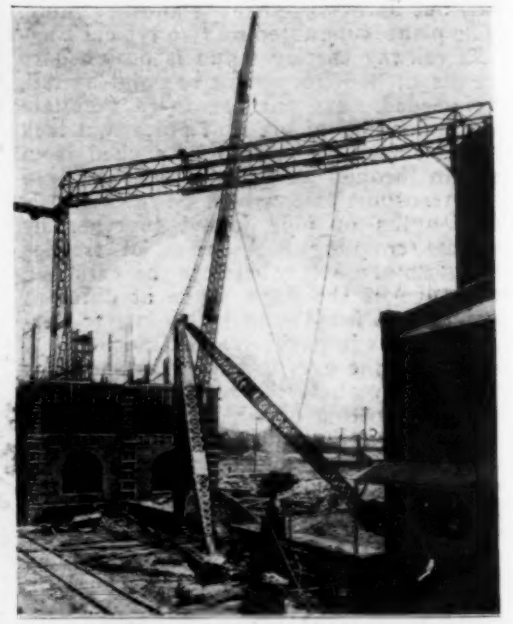
¶A large number of Dutch workmen formerly employed at the Krupp works in Germany have recently returned to that plant and are now said to be engaged in constructing railway material.

SUBSTITUTES FOR PETROLEUM IN MINERS' LAMPS TRIED

Extensive investigations, including practical tests by miners, have been made in Spain of substitutes for petroleum as a fuel for miners' lamps. One mixture which has found a degree of favor among underground workers contains 77.5 per cent of 96° alcohol, and 22.5 per cent benzol. A principal objection to this fuel is that the illuminating power of a lamp burning it is but 77 per cent of a standard petroleum lamp. To remedy this, a mixture has been tried consisting of 62 per cent, by volume, of the alcohol mentioned above, 16 per cent of benzol, 7.5 per cent of rectified turpentine, and 14.5 per cent of fusel oil.

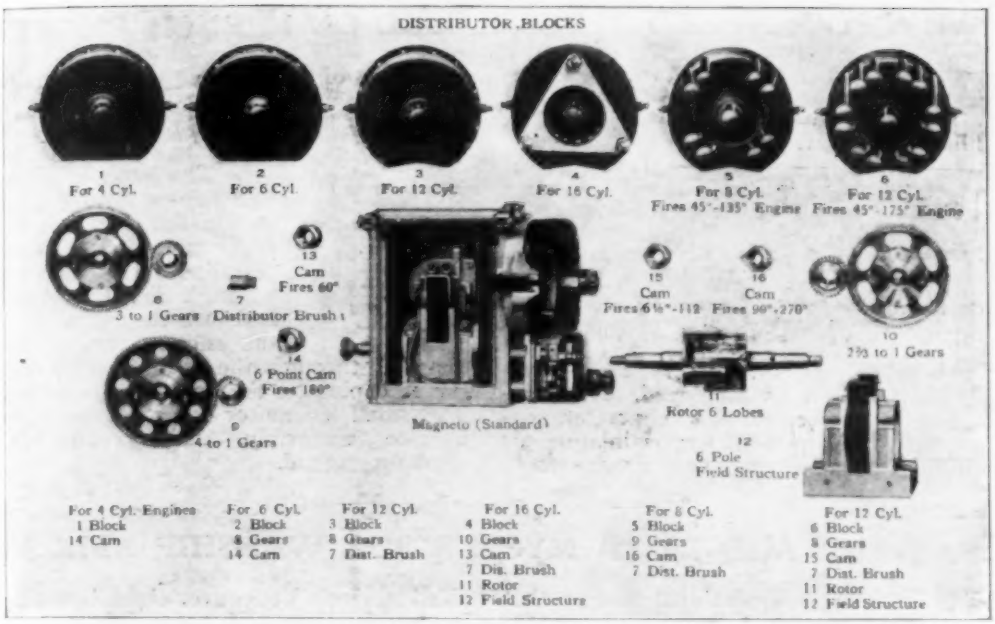
EXTRA-LONG DERRICK BOOM FOR SPECIAL JOB

To erect galleries for a belt conveyor in a Minneapolis plant, the engineers found that hoisting apparatus of unusual dimensions was necessary, and accordingly increased the length of a derrick boom to 132 ft., which is exceptional for equipment used in factory construction. The



Derrick with Boom Lengthened to 132 Feet, Used in Raising the Steel Frame of a Belt-Conveyor Gallery to the Lofty Position Shown Here

giant arm was placed almost perpendicularly, and with it the steel frames of the galleries were raised onto their supports in the ordinary manner.

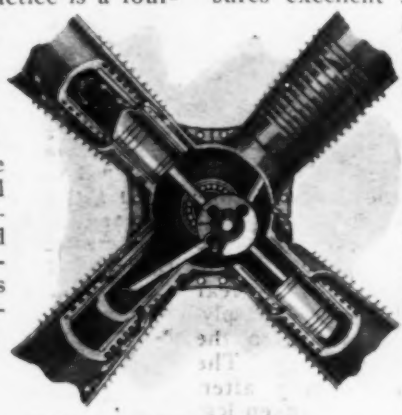

DISTRIBUTOR BLOCKS
1 For 4 Cyl.
2 For 6 Cyl.
3 For 12 Cyl.
4 For 16 Cyl.
5 For 8 Cyl. Fires 45°-135° Engine
6 For 12 Cyl. Fires 45°-175° Engine
8 3 to 1 Gears
13 Cam Fires 60°
7 Distributor Brush
14 6 Point Cam Fires 180°
9 4-to 1 Gears
Magneto (Standard)
15 Cam Fires 67½°-112
16 Cam Fires 90°-270°
10 2½ to 1 Gears
11 Rotor 6 Lobes
12 6 Pole Field Structure
For 4 Cyl. Engines 1 Block 14 Cam
For 6 Cyl. 2 Block 8 Gears 14 Cam
For 12 Cyl. 3 Block 8 Gears 7 Dist. Brush
For 16 Cyl. 4 Block 10 Gears 13 Cam 7 Dis. Brush 11 Rotor 12 Field Structure
For 8 Cyl. 5 Block 9 Gears 16 Cam 7 Dist. Brush
For 12 Cyl. 6 Block 8 Gears 15 Cam 7 Dist. Brush 11 Rotor 12 Field Structure

CONVERTIBLE MAGNETO SUITED FOR ALL AEROPLANE MOTORS

AMONG the war-inspired American inventions of importance that may now be discussed freely, there is a standardized magneto that is capable of conversion to seven different models. These assemblies accommodate all aeroplane engines in general use. Obviously this eliminates the necessity of keeping a large assortment of different types of magnetos and hundreds of spare parts at supply depots. The new instrument has been adopted by the United States government as the standard aeroplane magneto, and praised highly by England, France, and Italy. Sixteen extra parts enable the various changes necessary for four, six, eight, 12, and 16-cylinder motors, and eight, 12, and 45° cylinders, to be made. Six of these parts are distributor blocks, and three of them gear combinations.

AERIAL MOTOR BUILT INTO PROPELLER

Of interest because of its radical departure from standard practice is a four-cylinder, two-stroke rotary aeroplane engine, of recent development in England, that is arranged to form an integral part of a four-blade propeller. Those who have followed closely the trend in other fields will recognize the self-contained unit as an aeronautic application of similar ideas already utilized in motorcycle, automobile, and tractor designing of late. While in most of its particulars the present invention demands no detailed explanation, it might be mentioned that the propeller blades are constructed of metal and utilized as exhaust-expansion chambers. Owing to centrifugal force, this plan insures excellent scavenging of the spent gases, it is asserted. The merits of the invention are yet to be demonstrated, but regardless of this the features are interesting.

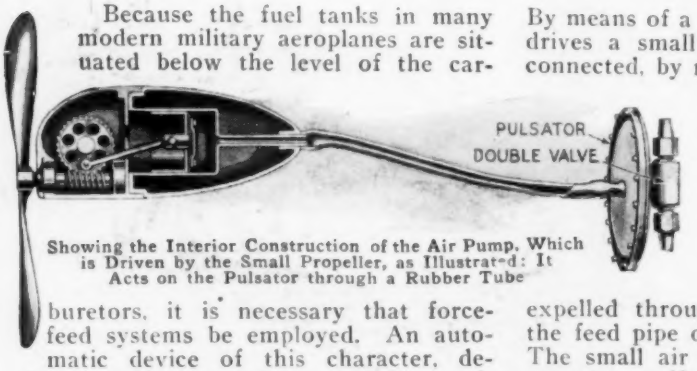


BY COURTESY OF THE MOTOR CYCLE, LONDON

Phantom Drawing, Showing How the Four Cylinders of the Novel Rotary Motor are Incorporated in a Four-Blade Propeller

¶It was recently announced that a new synthetic process of making glycerin in quantity by fermentation of sugar, at low cost, was perfected for our government and kept secret, for use in explosive making. The process, which probably will revolutionize glycerin production, was found following reports that Germany had discovered a like method. America also gave the allies the benefit of its secret.

NEW FORCE-FEED SYSTEM USED ON FRENCH PLANES

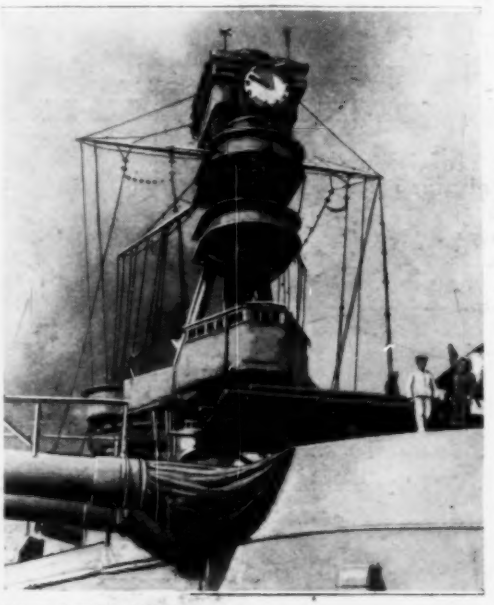


Showing the Interior Construction of the Air Pump, Which is Driven by the Small Propeller, as Illustrated: It Acts on the Pulsator through a Rubber Tube

Because the fuel tanks in many modern military aeroplanes are situated below the level of the carburetors, it is necessary that force-feed systems be employed. An automatic device of this character, designed to be operated by a miniature air propeller, is used on certain French craft. By means of a worm and gear, the screw drives a small pneumatic pump that is connected, by means of a reinforced-rubber tube, with a pulsator. The latter is joined to a two-way valve fitted in the line between the fuel tank and motor. Gasoline is drawn through the first valve and into the pulsator on the suction stroke, and expelled through the second valve into the feed pipe on the compression stroke. The small air motor is geared so as to operate uniformly, making one full stroke a second.

FASTEST AND MOST MYSTERIOUS WARSHIP AFLOAT

Of the many sensational stories that have come out of the war, none is more fascinating than that of Great Britain's so-called "mystery" ships. Three of these astonishing vessels are said to be afloat, and photographs are now at hand to take the place of the official confirmation that has been lacking. Pictures, of course, prove nothing concerning the amazing performance accredited to the craft, but at least they strengthen conviction that there is something remarkably unusual about these ships over which an almost impenetrable veil of secrecy has been thrown.



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Bow View of the "Renown," One of the British Navy's 60-Mile an Hour Warships, Showing Its Watch Tower and the Clock It Carries Atop

Briefly, it is asserted that one of these mysterious ships carried Foreign Minister Balfour across the Atlantic in three days, when the Siberian situation made his presence in Washington highly necessary in the interest of the allied cause. Also it is claimed that a group of British army officers was enabled to reach Vancouver eight days after leaving London and there join the Siberian expedition. One of the fast vessels is understood to have carried the officers to Halifax, where special railway accommodations awaited them.

Sixty-two miles an hour is the remarkable speed that the astonishing ships are claimed to have shown in official tests. Fifty-six miles an hour is the equally astonishing "average daily speed" they are supposed to have maintained in all kinds of seas. For a great ship to journey 1,341 miles in a single day is something new under the sun.

According to reports that seem to be borne out by photographs, the ships are of the cruiser type so far as appearance is concerned. They are described as being larger than destroyers, and armed with 15-in. rifles mounted in fore and aft turrets.

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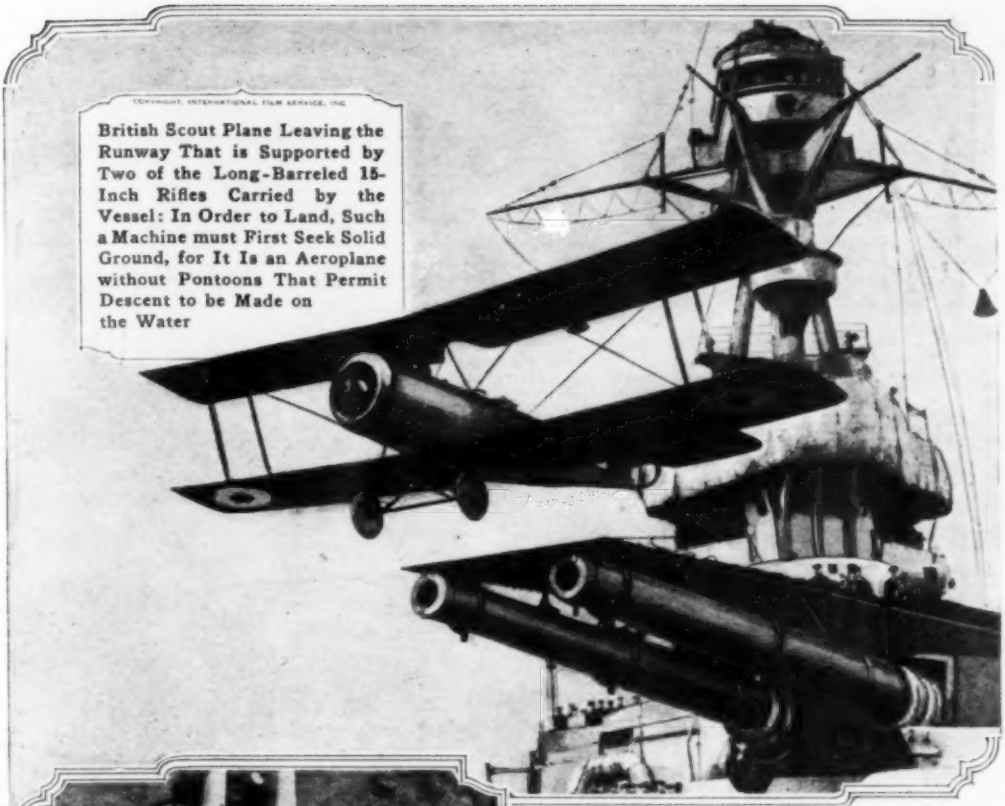

British Scout Plane Leaving the Runway That is Supported by Two of the Long-Barreled 15-Inch Rifles Carried by the Vessel: In Order to Land, Such a Machine must First Seek Solid Ground, for It Is an Aeroplane without Pontoons That Permit Descent to be Made on the Water

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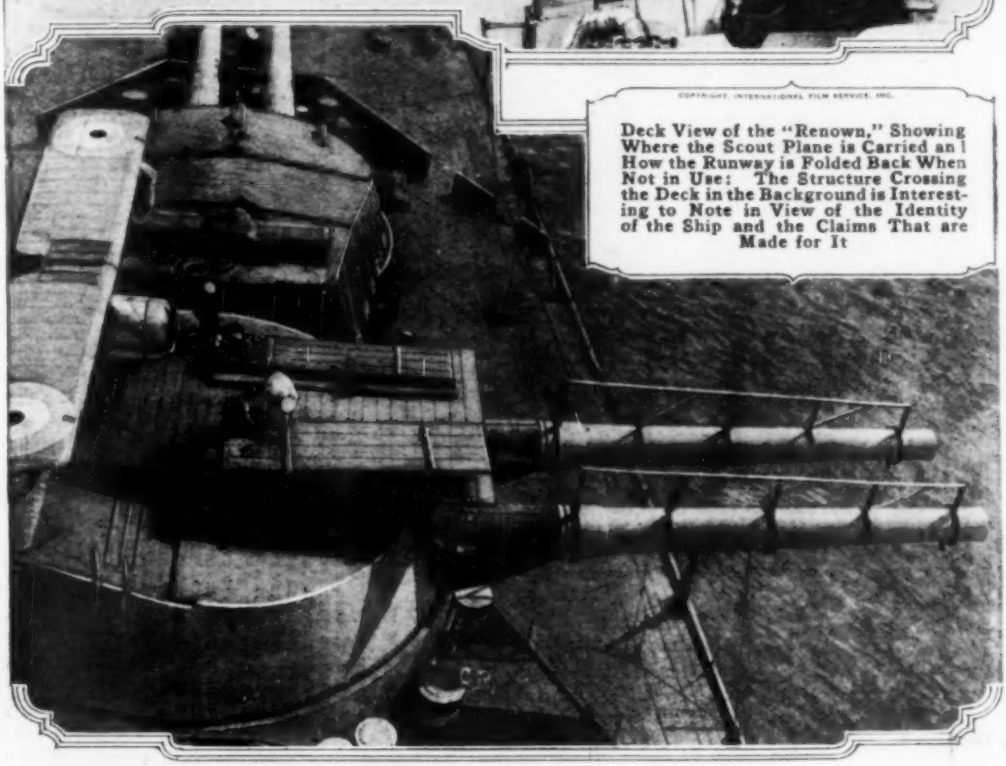
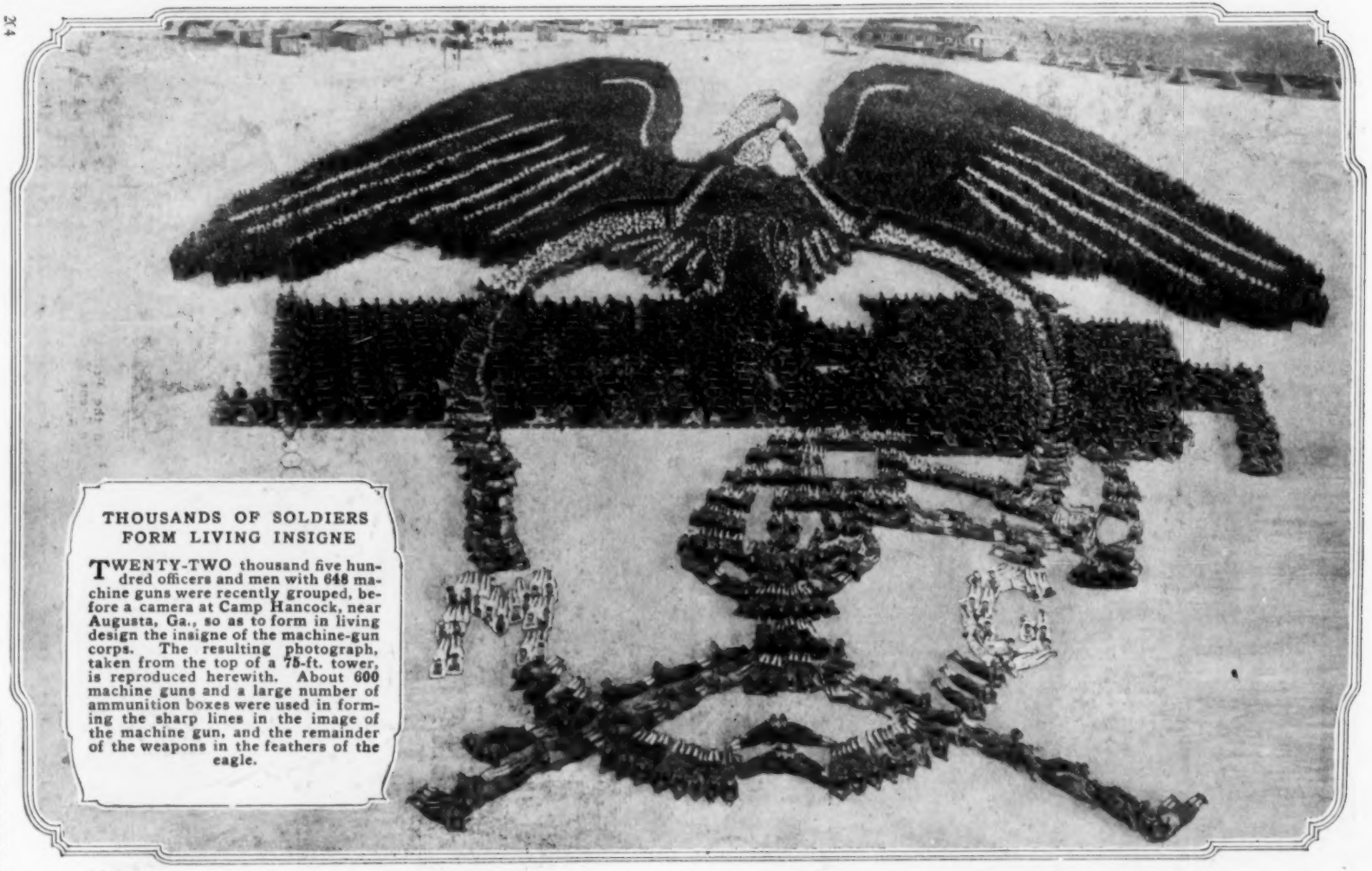


Deck View of the "Renown," Showing Where the Scout Plane is Carried and How the Runway is Folded Back When Not in Use: The Structure Crossing the Deck in the Background is Interesting to Note in View of the Identity of the Ship and the Claims That are Made for It



THOUSANDS OF SOLDIERS FORM LIVING INSIGNE

TWENTY-TWO thousand five hundred officers and men with 648 machine guns were recently grouped, before a camera at Camp Hancock, near Augusta, Ga., so as to form in living design the insigne of the machine-gun corps. The resulting photograph, taken from the top of a 75-ft. tower, is reproduced herewith. About 600 machine guns and a large number of ammunition boxes were used in forming the sharp lines in the image of the machine gun, and the remainder of the weapons in the feathers of the eagle.

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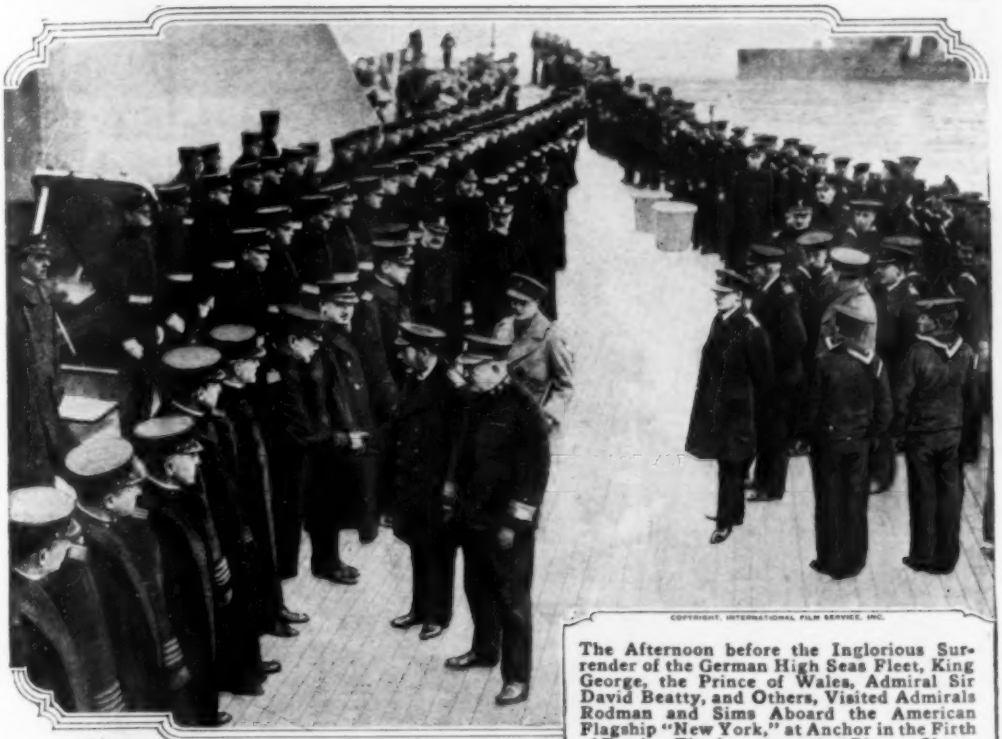
GRAND WIND-UP, ON LAND AND SEA, OF GREAT WAR



The Afternoon before the Inglorious Surrender of the German High Seas Fleet, King George, the Prince of Wales, Admiral Sir David Beatty, and Others, Visited Admirals Rodman and Sims Aboard the American Flagship "New York," at Anchor in the Firth of Forth. The Accompanying Picture Shows Admiral Rodman Introducing Officers of His Command to the Royal Party

Hats Off, Not to the Hun, but to the Prince of Peace: This Remarkable Photograph Records the Scene Enacted as the Armistice Terms were Read to a Group of British Soldiers Immediately after the Last Gun of the War was Fired. From Facial Expressions One Assumes the Terms Met with Tommy's Entire Satisfaction

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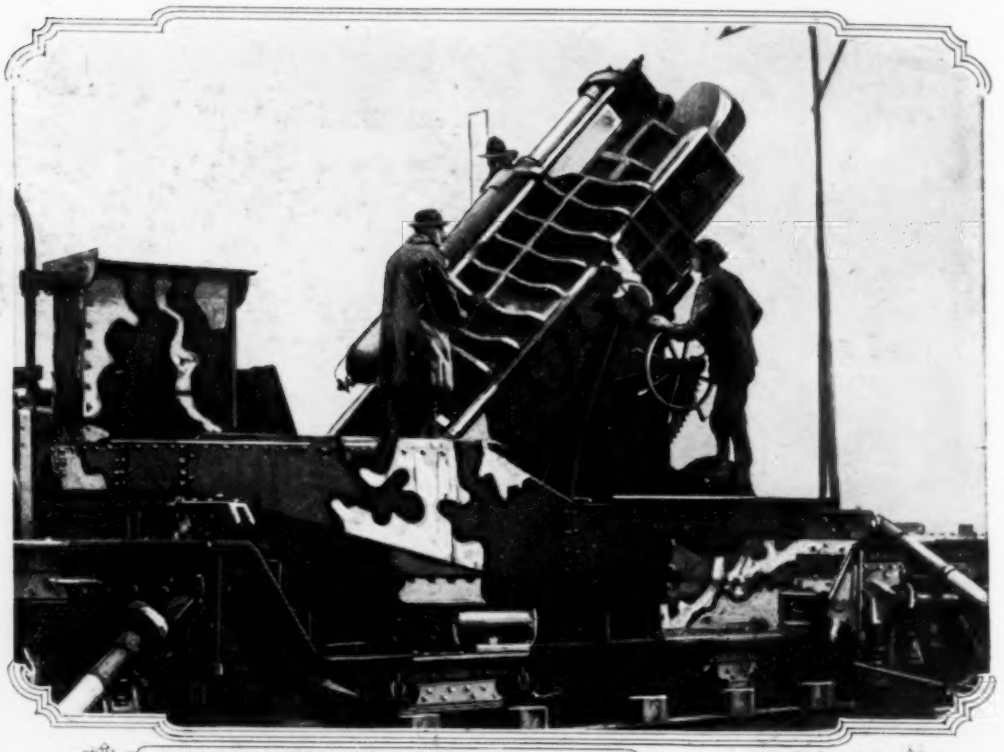
SOME OF AMERICA'S BIG ARTILLERY BATTERIES



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Modified Somewhat for Use on a Railway Carriage, This Queer-Looking Weapon Is a Standard 12-Inch Coast-Defense Mortar. The Recuperator Is Hydropneumatic and of Special Design. There Are Two Recoil Brakes beneath the Cradle. The Projectile Weighs 700 Pounds

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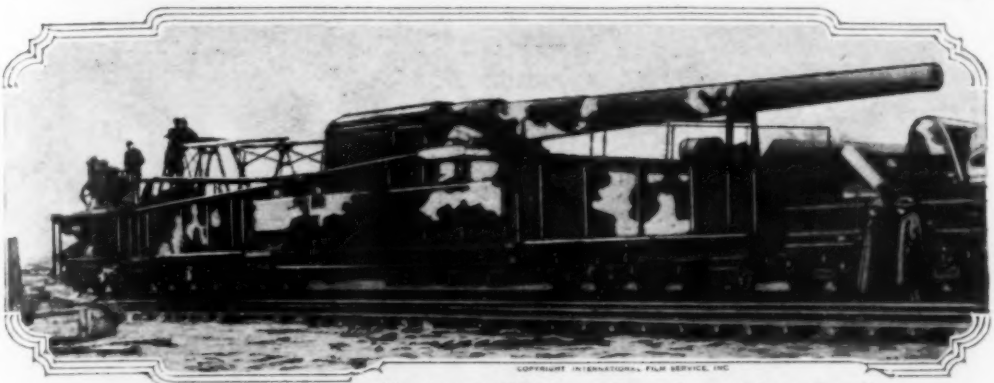
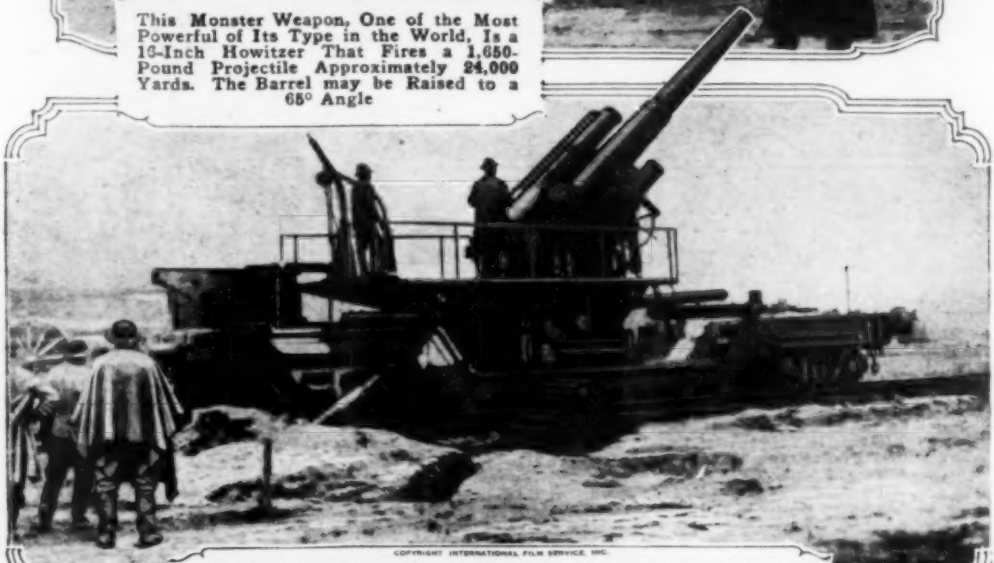
One of the Most Interesting of All of America's Heavy Artillery Pieces, an Eight-Inch Howitzer Built into a Creeper-Tread Tractor of Special Construction: The Complete Outfit Weighs About 55,000 Pounds and Is Able to Go Anywhere a Fighting Tank can Climb. The Combination Is a Real Novelty

ON MOBILE MOUNTINGS SEEN AT CLOSE RANGE



Showing the Daubing of Camouflage Artists: One of Our Long-Range 14-Inch Naval Guns Mounted on a Heavy Railway Carriage. It Recoils, When Fired, on a Steel I-Beam Fixed beneath the Frame. The Maximum Movement Is Only 48 Inches

This Monster Weapon, One of the Most Powerful of Its Type in the World, Is a 16-Inch Howitzer That Fires a 1,650-Pound Projectile Approximately 24,000 Yards. The Barrel may be Raised to a 65° Angle



Fourteen-Inch Rifle Fitted with Oil-and-Spring Recoil Mechanism and Mounted in the Well of a Specially Designed Railway Truck: Its Projectile Weighs 1,200 Pounds and is Hurled a Distance of About 40,000 Yards. The Weight of the Gun and the Car Complete Amounts to 400,000 Pounds

RANDOM CAMERA SHOTS FROM DEVASTATED EUROPE

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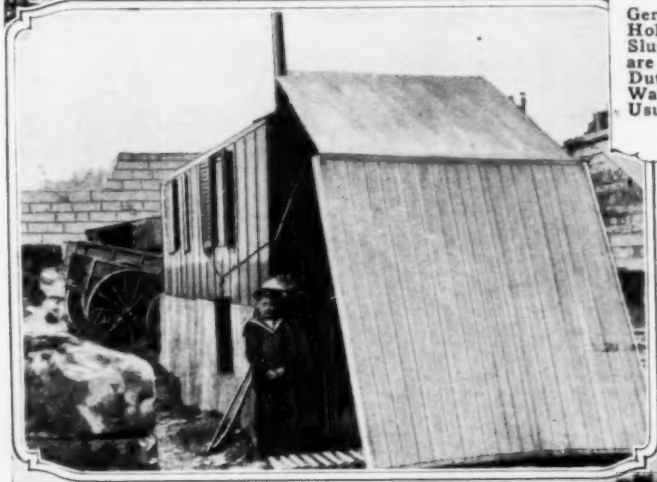
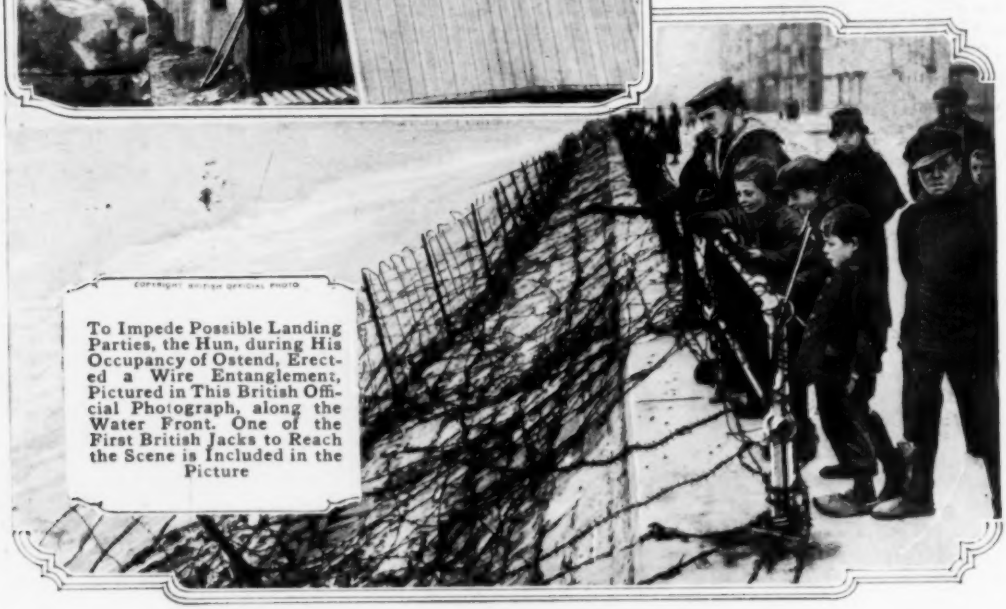
German Soldiers, Who Violated Holland's Neutrality by Entering Sluis, in the Province of Zeeland, are Here Shown in the Custody of Dutch Frontier Guards on Their Way to an Internment Camp. The Usual Crowd of Small Boys Is in Attendance



This Strange-Looking Shanty, One of the Portable Houses Erected in France by the American Red Cross, Shelters a Widely Known French Countess and Her Young Son. The Woman's Husband was Killed in the War and Their Chateau, Which Stood on the Site of the Present Humble Dwelling, Demolished



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To Impede Possible Landing Parties, the Hun, during His Occupancy of Ostend, Erected a Wire Entanglement, Pictured in This British Official Photograph, along the Water Front. One of the First British Jacks to Reach the Scene is Included in the Picture

EPOCHAL GERMAN EVENTS PICTORIALLY TREATED

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Showing the Triumphal Entry of French Troops into the Alsatian City of Colmar, Which Is between Mulhausen and Strassburg, Close upon the Heels of the Retiring Hun. The Troops are being Reviewed by an Old General of 1870, in Uniform of That Date, and Civil Officers

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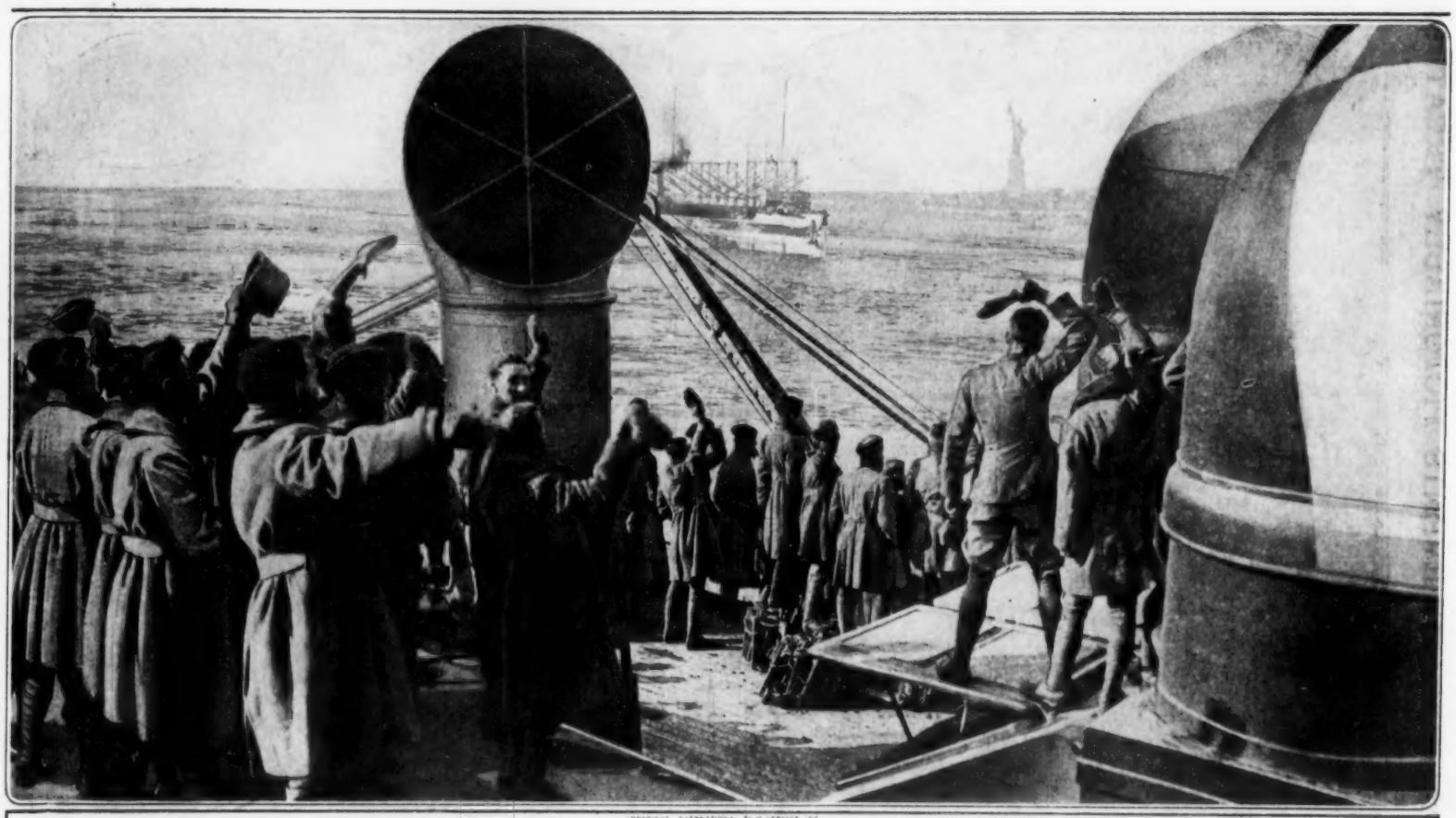
The Orderly Way in Which the Citizens of Berlin Received the News of the Kaiser's Flight, and the Establishment of a Republican Form of Government, is Illustrated by the Photograph Above. Philip Scheidemann is Reading the Revolutionary Proclamation to the Crowd before the Reichstag Building



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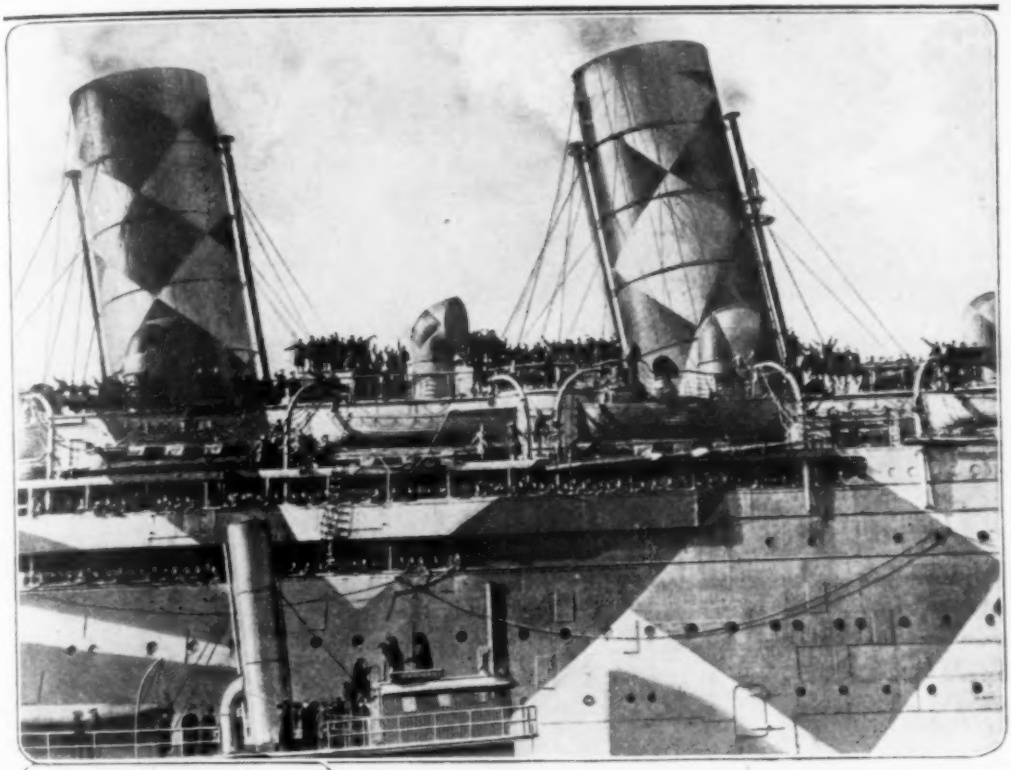
HOME-COMING SOLDIERS CHEER STATUE OF LIBERTY AS TRANSPORT STEAMS INTO HARBOR

As the "Mauretania" Steamed up the Harbor, Its Decks were Packed with Uniformed Men, Who Silently Watched the Shore Line Until the Goddess of Liberty Was Abeam. From Stem to Stern a Great Cheer Arose and Caps were Waved in Salute. The Photograph Reproduced Above was Taken at the Memorable Moment When the Returning Soldiers Thus Paid Homage to Their Native Land's Emblem of Freedom. After Disembarking, the Troops were Taken by Ferry to Long Island City, and from There to Camp Mills

"MAURETANIA" BRINGS FIRST TROOPS FROM EUROPE



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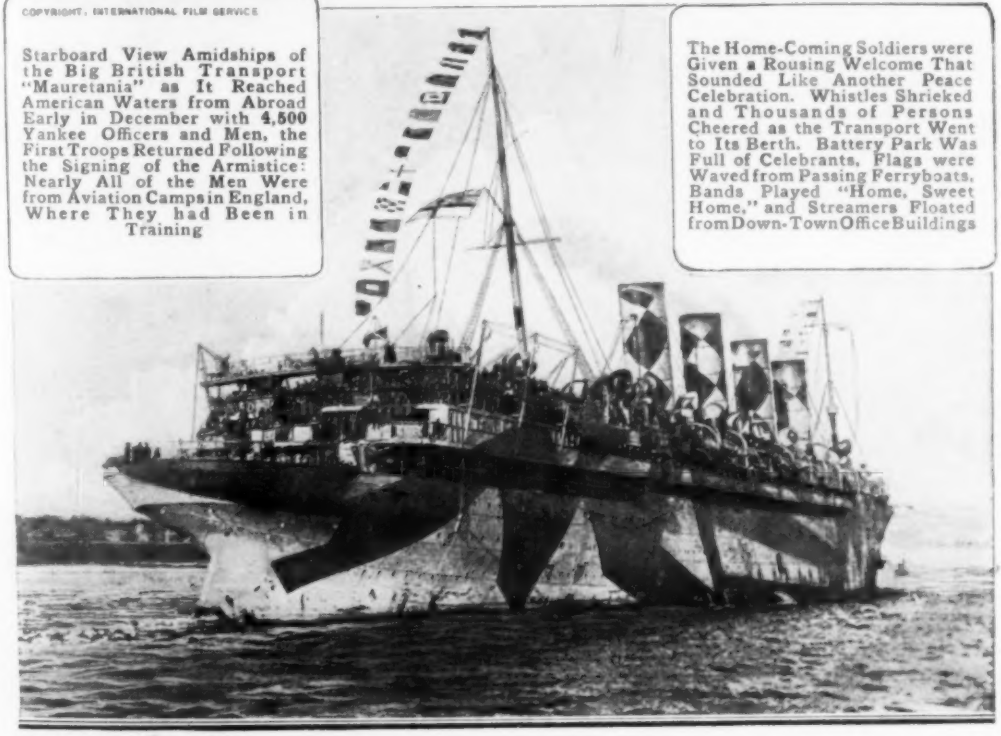
Starboard View Amidships of the Big British Transport "Mauretania" as It Reached American Waters from Abroad Early in December with 4,500 Yankee Officers and Men, the First Troops Returned Following the Signing of the Armistice: Nearly All of the Men Were from Aviation Camps in England, Where They had Been in Training

The Home-Coming Soldiers were Given a Rousing Welcome That Sounded Like Another Peace Celebration. Whistles Shrieked and Thousands of Persons Cheered as the Transport Went to Its Berth. Battery Park Was Full of Celebrants, Flags were Waved from Passing Ferryboats, Bands Played "Home, Sweet Home," and Streamers Floated from Down-Town Office Buildings



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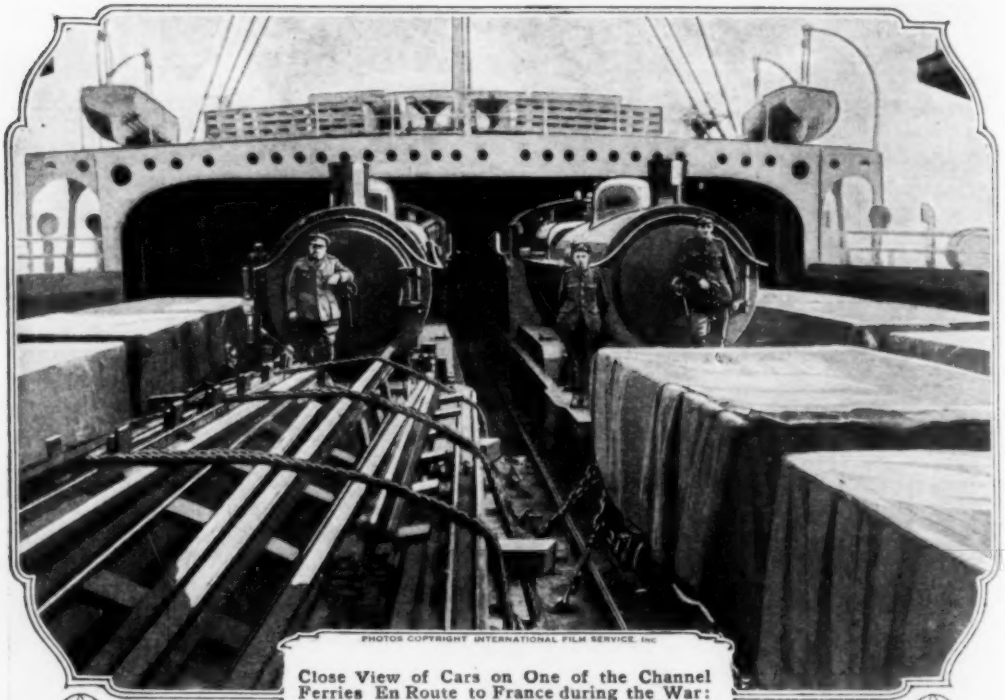
CAR FERRIES PERMITTED ENGLAND TO SHIP WAR



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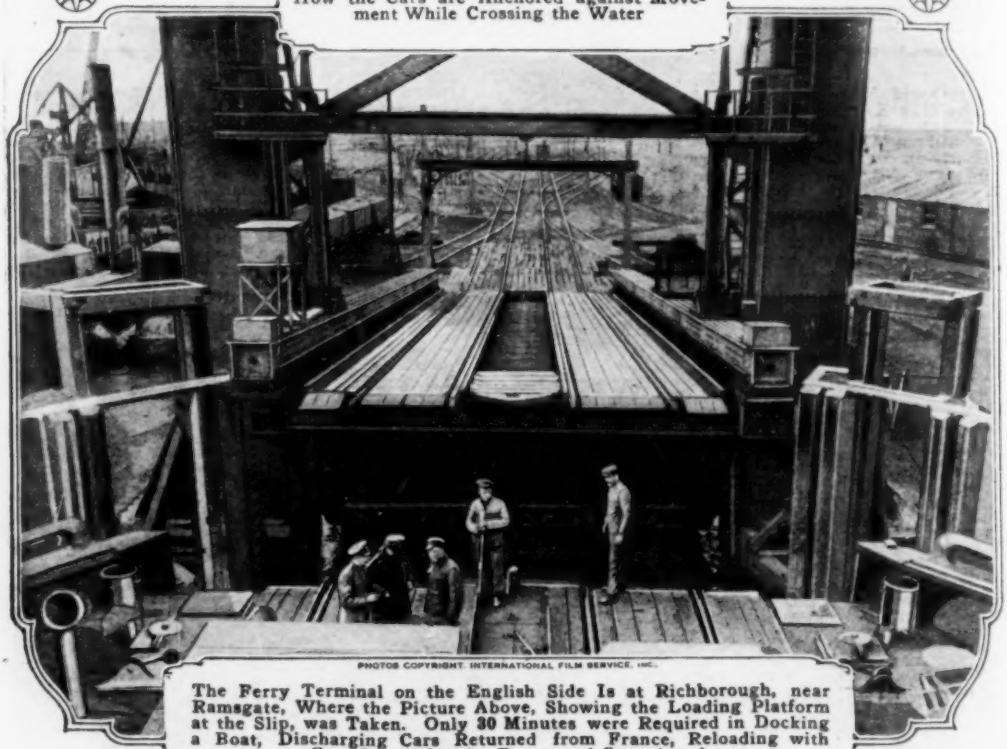
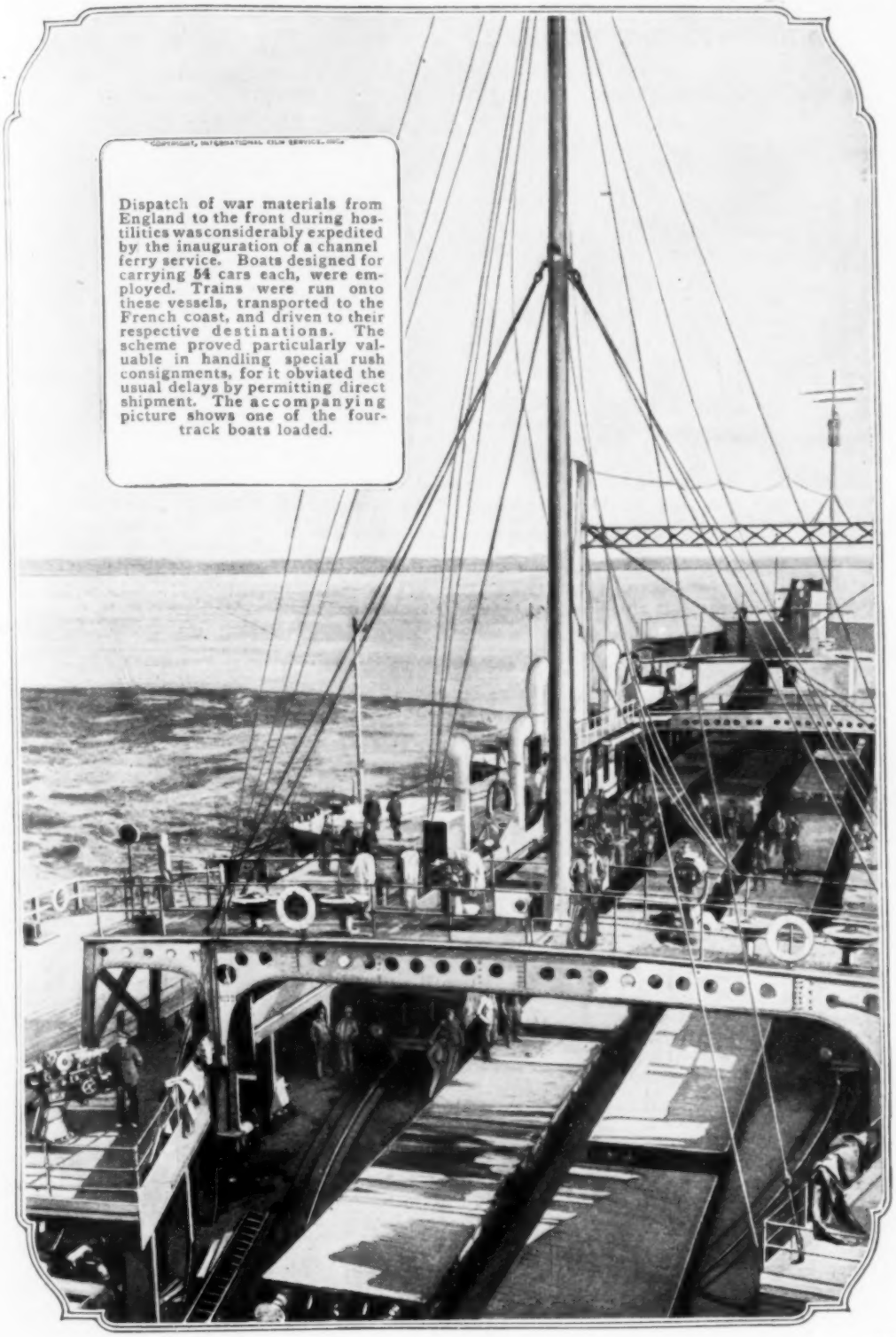
Close View of Cars on One of the Channel Ferries En Route to France during the War: A Glance between the Two Trains Shows How the Cars are Anchored against Movement While Crossing the Water



PHOTOS COPYRIGHT INTERNATIONAL FILM SERVICE, INC.

The Ferry Terminal on the English Side Is at Richborough, near Ramsgate, Where the Picture Above, Showing the Loading Platform at the Slip, was Taken. Only 30 Minutes were Required in Docking a Boat, Discharging Cars Returned from France, Reloading with Cars Bound for the Front, and Steaming Away

SUPPLIES ABROAD WITHOUT RELOADING AT PORTS



Dispatch of war materials from England to the front during hostilities wasconsiderably expedited by the inauguration of a channel ferry service. Boats designed for carrying 54 cars each, were employed. Trains were run onto these vessels, transported to the French coast, and driven to their respective destinations. The scheme proved particularly valuable in handling special rush consignments, for it obviated the usual delays by permitting direct shipment. The accompanying picture shows one of the four-track boats loaded.

TEST FLIGHT SHOWS NEW PLANE TO BE AMERICAN TRIUMPH

Remarkable performance was shown by a new American-designed and built two-seater monoplane that was put through its trials at Dayton, Ohio, recently. Carrying two persons and full military equipment, including four machine guns and 2,000 rounds of ammunition, it developed the record speed of 145 miles an hour. Also, it reached an altitude of 25,000 ft. Of further significance is the fact that it climbed 10,000 ft. in eight minutes. In accomplishing these feats, it showed its superiority over existing European single seaters. The monoplane is of 32-ft. span and 7-ft. chord. It weighs only 1,300 lb., and because of this, is said to be able to carry a live load almost as great. It mounts a 300-hp. American-built Hispano-Suiza motor that gives it a speed range of more than 100 miles an hour. Obviously this means an unusually low landing speed, a most valuable asset. The design of the plane is noticeably original. It has only one-tenth as many parts as the average European single seater. All wire stays have been eliminated, and the wings are braced by metal struts. For the first time a monoplane with the strength of a biplane has been constructed.

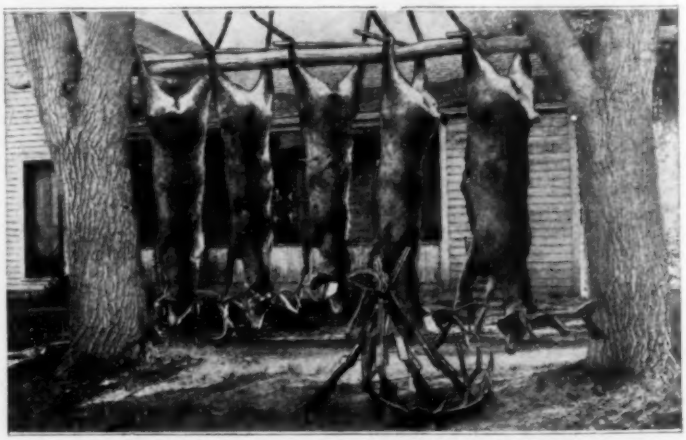
America's New Monoplane Occupies the Center of the International Aeronautical Stage. It Carries Almost Twice as Great a Load as a Spad or Sopwith Single Seater, and Climbs and Flies Faster Than Either of Them

NEW RULING AIDS EXPORTERS AND FOUR ALLIED NATIONS

Exporters in this country have been relieved of a great amount of hampering routing, as well as not infrequent delays, by a new ruling of the War Trade Board which went into effect December 16 last. This provides that individual export licenses are no longer required for any commodity destined for the United Kingdom, France, Italy, or Japan, or their possessions, except those commodities found in the board's conservation list. The ruling will benefit producers and also our allies, who are in immediate need of much material. It is not necessary to apply to the War Trade Board to make shipments under the new ruling, and no special documents from the board are needed. It is stipulated, however, that on the package or export declaration should appear certain information, including a list of contents.

BRIEF OPEN SEASON FOR DEER ENJOYED BY THOUSANDS

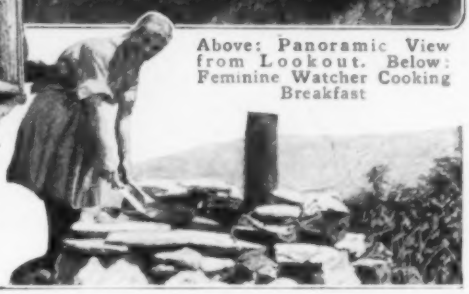
Colorado had its first open season for deer since 1913 last fall and it lasted but three days, yet for that brief period approximately 17,000 persons took out licenses, showing their fondness for deer



Five of the Hundreds of Deer Which Hunters Killed in Colorado during a Three-Day Hunting Season—the First in Five Years

A University Girl and a High-School Girl, with Spade and Axe, Ready for the Climb to Their Lofty Post

A Lone Guardian of the Forests in Her Lookout with Her Dog



Above: Panoramic View from Lookout. Below: Feminine Watcher Cooking Breakfast

hunting by spending thousands of dollars on guns, ammunition, transportation, etc. Many days before the season opened the supply of licenses was exhausted. The number of animals shot by these sportsmen is estimated at 500. Calculating each hunter's expense for three days at $50, it seems safe to say that the venison from no other equal number of deer ever proved so expensive.

BEST RADIO APPARATUS KNOWN ON PRESIDENT'S SHIP

The most modern radio apparatus known was provided to keep President Wilson in touch with Washington and the rest of the world while crossing the Atlantic. The battleship "Pennsylvania," one of the fleet accompanying the president's boat, the "George Washington," was equipped with the most powerful transmitting set on any American naval ship. Both the "George Washington" and the big battleship had apparatus for receiving messages from high-power stations. Radio telephones and low-power radio sets were utilized when one ship communicated with the other. Messages from the president were relayed to the "Pennsylvania," which sent them to three radio stations located at various points in the East. Each of these stations transmitted the messages to an office in the Navy Department, where comparisons of text were made before delivery to the persons addressed. All messages to the president passed through this same office.

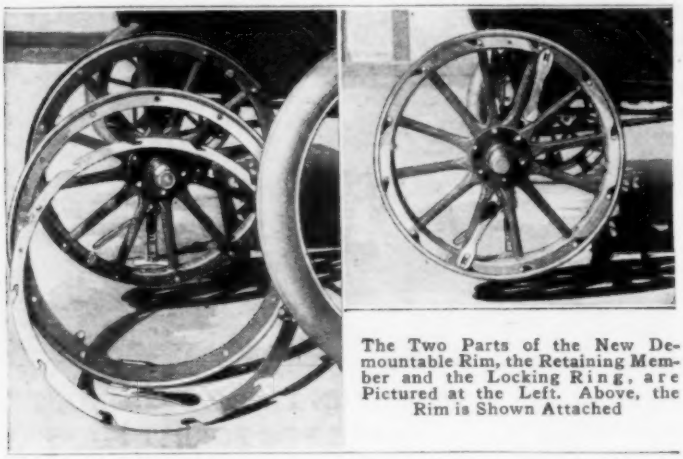
WOMEN IN LONELY LOOKOUTS WATCH FOR FOREST FIRES

To the creditable list of occupations in which the war showed women to be efficient and faithful, may be added that of serving as observers in lookout posts on the peaks of western mountains and hills. From these lonely points of vantage watch is constantly kept for forest fires in the region roundabout. Because of the scarcity of available men during the war, this work was performed largely by women and girls, many of the latter being of high-school age who were glad of an opportunity to spend a summer vacation in the open. Usually the girls "manned" the posts in pairs, but in one instance a lone girl and her faithful dog were on duty. Whenever smoke was seen rising among the trees it was the task of the watcher to calculate the location of the fire by means of special apparatus provided for the purpose, and then communicate at once by telephone to the forest rangers, who would hurry out prepared to fight the flames.

NOVEL LOCKING MEANS FOR DEMOUNTABLE RIM

Among the new quickly demountable rims that have been invented for a common light motor car, there is one of particularly unusual design. It consists of a retaining rim and locking ring. Spaced equidistantly about the circumference of the former is a series of holes that fit over

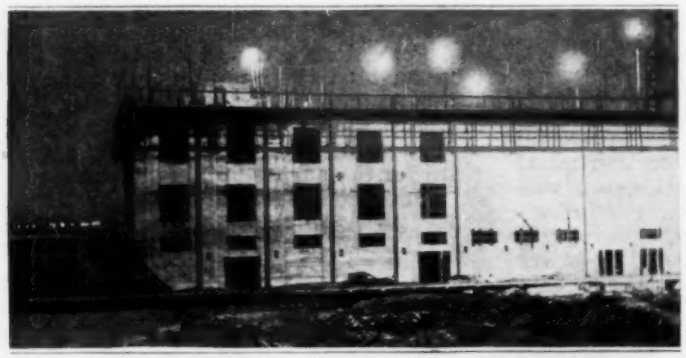
pins in the felly. When the rim has been slipped in place, the locking rim, which is supplied with a sequence of open slots, is attached with the aid of a special wrench. It is asserted that with the rim in use, an eight-year-old boy has been able to remove and replace a tire in less than one minute.



The Two Parts of the New Demountable Rim, the Retaining Member and the Locking Ring, are Pictured at the Left. Above, the Rim is Shown Attached

WORK ON KANSAS FLOUR MILL NIGHT AND DAY

Realizing that there will be a great demand for food, particularly flour, for European nations during many months to come, the builders of a concrete flour mill at Hutchinson, Kan., the center of the wheat belt, exerted every effort to complete their work as soon as possible. The walls rose higher by night as well as by day, the work at night being done with the aid of twenty-five 500-watt tungsten lights.



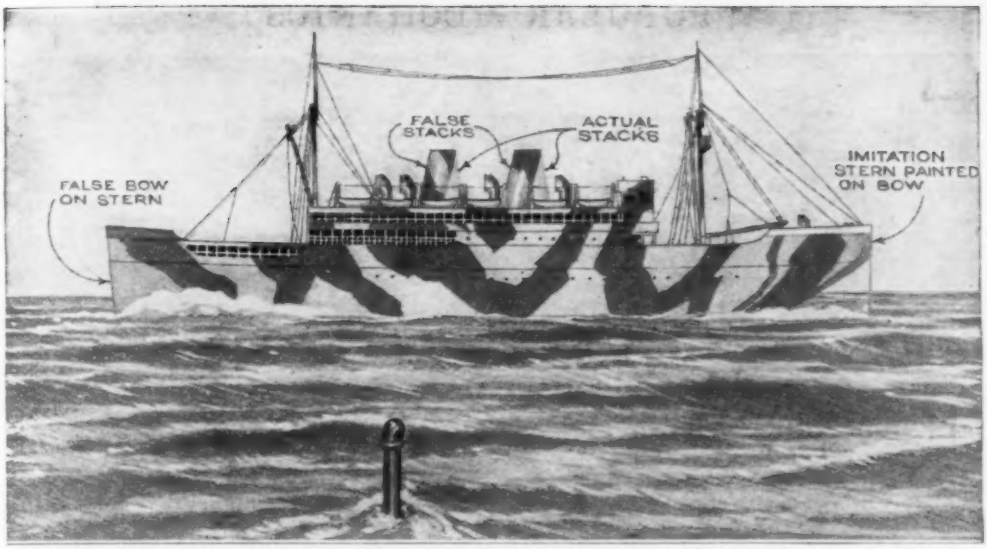
Night View of Flour Mill under Construction at Hutchinson, Kansas: Twenty-Five 500-Watt Tungsten Lights Made Night Work Possible, So That the Structure was Completed in Quick Time

SOUTHERN STATES REJOICE AT VICTORY OVER TICKS

A good portion of the South is this winter rejoicing at the big advance which the government has made in eradicating the cattle-fever tick from its territory. A campaign has been on since 1906, and each year the quarantine has been lifted from considerable territory in which the inspectors have been at work, but last year the best record of all was made, more than 79,000 square miles having been officially declared "tickless," December 1, last. The fight against this pest, which has caused an annual loss of $40,000,000 by reason of its attacks on the live stock of the South, consists in dipping all cattle in a community at regular intervals in an arsenical solution. Last year's endeavors bring the total area freed of the pest up to 458,000 square miles, or 63 per cent of the entire region which was put under quarantine 12 years ago.

NOISES OF AEROPLANE MOTORS AND BOMBS IN MUSIC

As might be expected, the war's influence is evincing itself in some of the program music of British composers that is now being produced. One of the selections rendered recently at a London concert was the cacophonic story of a Zeppelin raid. The audience, being painfully familiar with the theme, experienced no difficulty in interpreting the music The droning of aeroplane motors, the muffled purring of Zeppelin engines, the staccato ripping of machine guns, and the bursting roar of bombs, all were developed realistically with snare drums, kettledrums, and large bass drums, aided by other instruments, which produced the human and colorful elements of the song.



A False Bow at the Stern, False Stack Lines, and Skillfully Deceptive Painting Make This Ship Appear to be Moving toward the Left instead of the Right, as Is Actually the Case. A Torpedo Fired at the Ship would Probably Harmlessly Cross Its Wake

MASTERPIECES OF NAVY CAMOUFLAGE

Ships Appear to Run Backward, Gunboats Look Like Yachts, Painted Destroyers Protect Leviathans

By LLOYD SEAMAN

WITH the lifting of the censorship curtain, camouflage on the high seas, as it was practiced throughout the war, comes for the first time into its own. Mystery, as deep and gray as sea fog, has hidden the tricks and systems of the navy camoufleurs. This was necessary because Germany herself did not know these marine arts. Her submarines could never establish contact strong enough to unravel the secrets of the ships that were made by paint and brush to disappear, to take strange forms, to sail backward, and to perform the weirdest tricks of legerdemain.

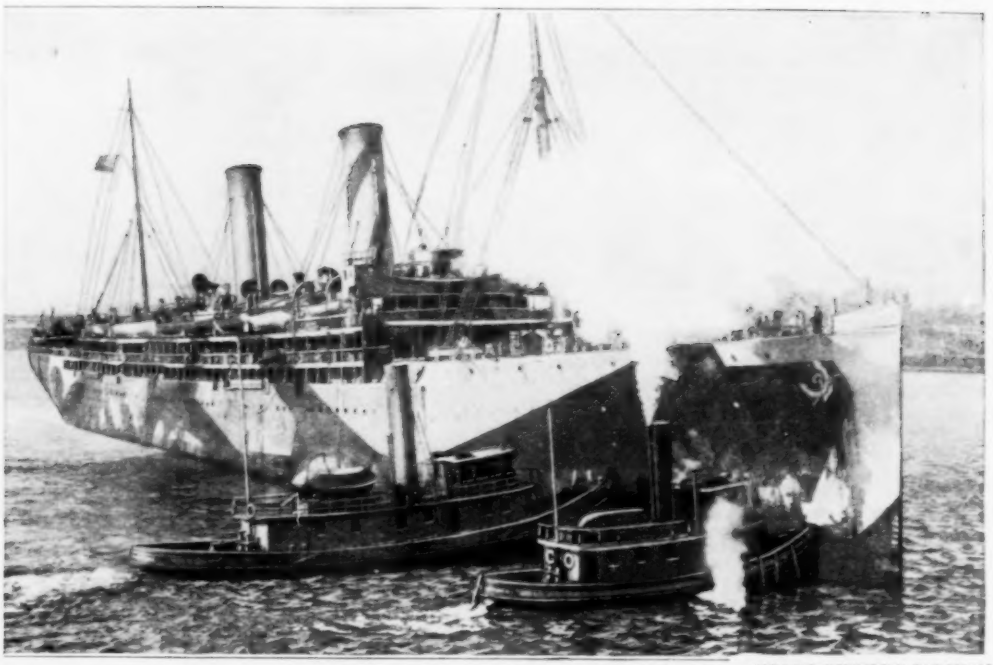
Long ago the public learned of camouflage on land, how towns and roads and trenches were "painted out"; how snipers masqueraded as trees; how batteries palmed themselves off as garbage heaps, etc. These fascinating army "stunts" of this newest of war arts were allowed to be told, because Germany knew them and in large part practiced them herself. The land opponents were in such intimate contact that neither could preserve secrets long from the other.

On the water, however, Germany was puzzled. And she never did fathom the plans and schemes of the navy camoufleurs. While the increasing inefficiency of the U-boats, as the war progressed, was, of course, largely due to the growing number of destroyers and seaplanes, full credit must be given the development of amazingly clever camouflage artifices.

For instance, it may now be told that scores of ships evaded torpedoes because, to the periscope eye, they were apparently steaming in one direction while actually progressing in the opposite way. This uncanny evolution was due wholly to brush and paint, and a few boards. It was accomplished by making the steamer's bow look like her stern, and her stern like her bow. At the rear, a steamer curves in below the deck line down to the water line. At her bow, she drops in a straight, sharp line from nose to the waves. So the camoufleurs nailed a scaffolding, sharp and straight, over her stern, painted upon it white waves breaking as from the slicing impact of a prow, and then proceeding to the real bow, painted upon either side a heavy curving line that swung inward below the deck line. Sea-color paint and broken lines of darker hues made the lower half of the bow line invisible.

The smokestacks, which always slant aft, were with paint and boards made to slant forward; that is, the real lines of the stacks were painted out and false lines and false angles substituted. Smoke consumers prevented the telltale clouds from giving the whole reversal policy away to the U-boats.

A periscope, cutting the surface for two



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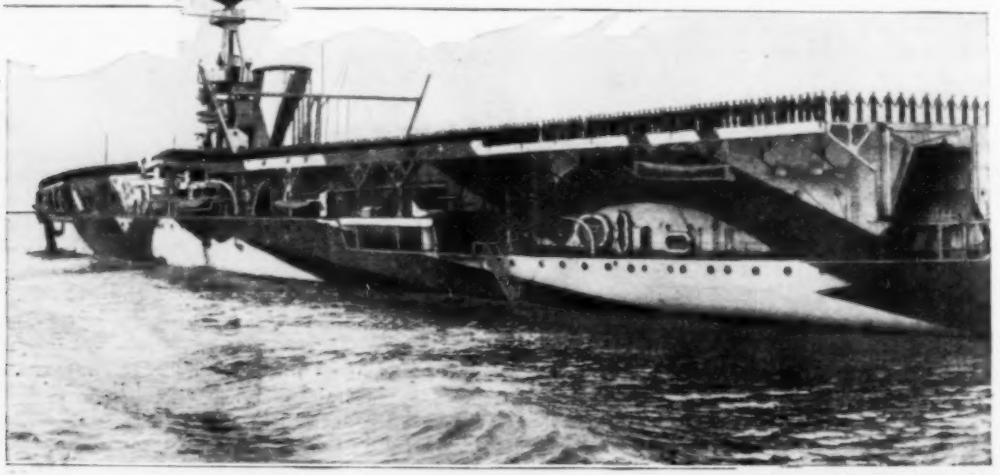
The "Balmoral Castle," the British Vessel That Took a Leading Part in Blocking Zeebrugge Harbor: She Steamed into New York Recently, Still Wearing Her Confusing Camouflage Armor

seconds, then submerging to "plop" up again for another peep, saw this steamer clearly, noted her apparent direction, and dived hastily to intercept her. When in a position advantageous for murder, the submersible rose. Lo and behold, the steamer was far astern, still steaming forward, but miles farther away than before! The U-boat commander thought himself drunk or crazy, and either gave up or made a desperate attempt to reach the steamer that was now too far away to catch. This subterfuge was the logical outcome of the first methods, which were simpler, consisting mainly of fundamental color studies, broken lines, calculated to hide the outlines of the ship, blending all sharp lines with the atmosphere, sea, and sky. These seemingly crazy daubs of



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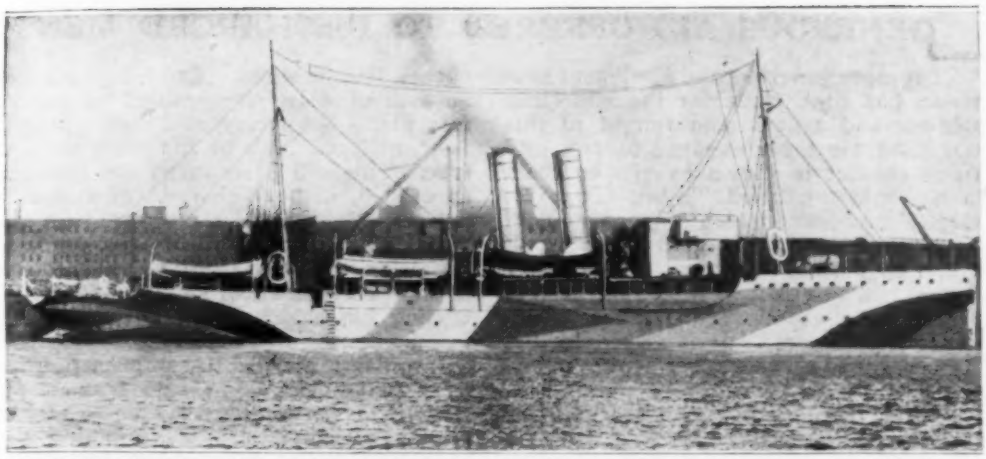
The British Aerodrome Ship "Furious," with Her Crew Lined Up for a Review: The Vessel's Broad Length would have Been an Admirable Torpedo Target, Were It Not for the Curves of Her Camouflage, Which Sometimes Caused Her to Look Like Several Ships, Bow On

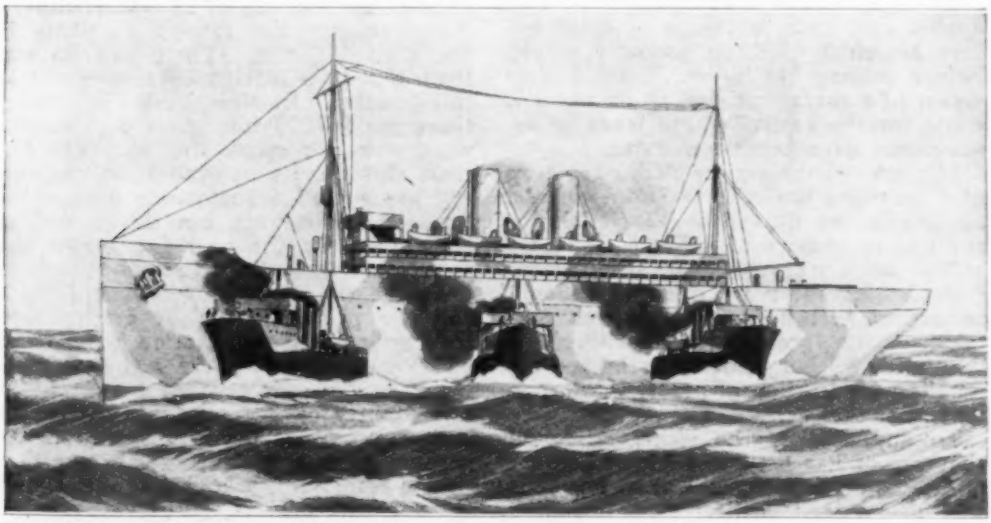


How the Old "Eastland" Atoned for the Disaster in the Chicago River in the Summer of 1916: She Is Now the Biggest and Fastest Gunboat of the American Navy. Her Camouflage Coat, Which Gave Her, from a Distance, the Lines of a Yacht, Afforded Her Effective Protection

paint served to blur the U-boat gunners' eyes. Gradually, better and more definite methods were worked out. Soon great liners put out to sea so camouflaged that at a distance they appeared to be small white yachts. Upon their sides, forward or aft, white paint was so placed that it drew the eye, while the vaster outlines above and behind it were concealed in neutral lines.

From this developed the still more effective system of painting destroyers on each side of the steamer—black realistic pictures of the small vessels drawn against the white flanks of the great ships. Smoke would be painted issuing from the destroyer's stacks, waves breaking at her prow, and guns looming fore and aft. What U-boat commander, peeping hastily, would not submerge and depart, for the destroyers meant death? A greater means of terrorizing submarines next appeared. Two or three destroyers were painted on the steamer's sides, with their noses pointed at right angles to the length of the steamer. When a periscope snatched a hasty glance, it saw these sea terriers bearing down right upon it.

This scheme worked especially well where the steamer bearing the picture protectors was in the same part of the sea with steamers surrounded with actual destroyers, and it served to free the real destroyers for more aggressive work.



The Masterpiece of Navy Camouflage: Destroyers are Painted upon the Sides of the Ocean Leviathans. No Hun Submarine Commander Cared to Face the Redoubtable Destroyers with Their Deadly Depth Bombs. Ordinarily, No Time was Spent in Investigation — the U-Boats Dived and Fled the Spot

GENEROUS AID OFFERED TO DISCHARGED MEN

That more generous and intelligent provision has been made for the American soldiers and sailors who fought in this war than for those engaged in any previous conflict is shown by the contents of a booklet entitled "When You Get Home," a copy of which is given to each discharged man. It contains facts which every man who wears, or has worn, a uniform should know regarding arrears in pay, legal matters, insurance, vocational training, etc. It is issued by the department of civilian relief of the American Red Cross.

If a soldier, on being discharged, receives what he believes is less than his full pay, the Home Service Section of the Red Cross stands ready to help him, making it unnecessary to hire an attorney or claim agent. With the assistance of local committees of lawyers, it is also ready to give legal advice free on other matters, to those who cannot afford to pay for it.

It is to a soldier's and sailor's advantage to know that if a court has rendered judgment against him by default, either while in the army or within 30 days after his discharge, he still has his chance in court if he applies in person, or through an attorney, within 90 days after his discharge. If payments by a soldier on a mortgage on property have become overdue while he was in the army, the Civil Relief Act forbids the selling of the property to meet the obligation, except by special court order, until three months after a soldier has been discharged. This applies only to a mortgage executed before March 8, 1918, on property owned before joining the army. Special provision of a somewhat similar character is made for the soldier whose taxes or assessments have become overdue.

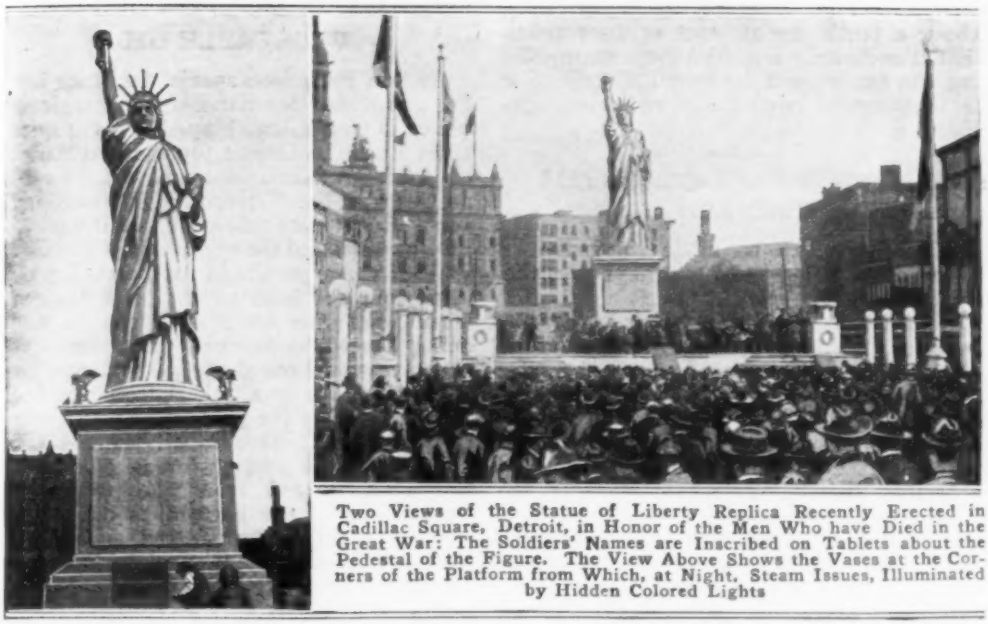
If a man in the service took advantage of a provision in the Civil Relief Act and applied to the Bureau of War Risk Insurance to protect his private insurance policy or fraternal-benefit membership from lapsing for nonpayment, he should remember that he must pay back premiums, with agreed interest, within one year after discharge, or if discharged after the proclamation of peace, within one year after that event.

To any soldier who wears a wound chevron, or has been discharged because of disease or disability, the army hospitals will give special medical care, including treatment designed to restore his health and improve his chances of success in a chosen line of work. Men who have lost an arm or a leg are entitled to receive free, first a temporary, and then a permanent, artificial limb of the most modern type. This will be repaired and replaced as needed, without charge. If a man is permanently disabled, the government will pay for the rest of his life a disability compensation which will not be reduced, no matter how successful he may be in overcoming his handicap and increasing his income.

If a man is entitled to compensation for even partial disability, the government offers him free training designed to fit him for a good job, and while taking the training, he is guaranteed a total income from all sources of at least $65 a month. The taking of this training is optional with the individual, but it is strongly recommended by the Red Cross. In addition to advice on legal matters, as indicated above, the Home Service Section stands ready to aid the soldiers and their families in many other ways, which only help to prove that the Red Cross is "the greatest mother in the world." The government is also making extensive plans designed to aid the soldiers in quickly returning to complete economic independence.

AMERICANIZING FOREIGNERS A GREAT PATRIOTIC TASK

To the Bureau of Naturalization, of the Department of Labor, has been assigned the big task of leadership in Americanizing the foreign elements in the United States. There are no less than 17,500,000 foreign-born residents in this country. In New York City, alone, there are 500,000 foreigners who cannot read, write, or speak English. The bureau, through its naturalization examiners, has gained acquaintance with about 3,000,000 immigrants, but this is only a beginning. In the past four years the public schools in 2,000 communities have furthered the work by teaching English and the principles of our government. How much real assimilation remains to be done is shown by the fact that, thus far, only two per cent of the aliens in this country have applied for citizenship instruction. The bureau aims to foster keener interest in this great question among employers, school authorities, and the public in general. Wisely conducted classes in factories and schools are a principal means of forwarding the work.



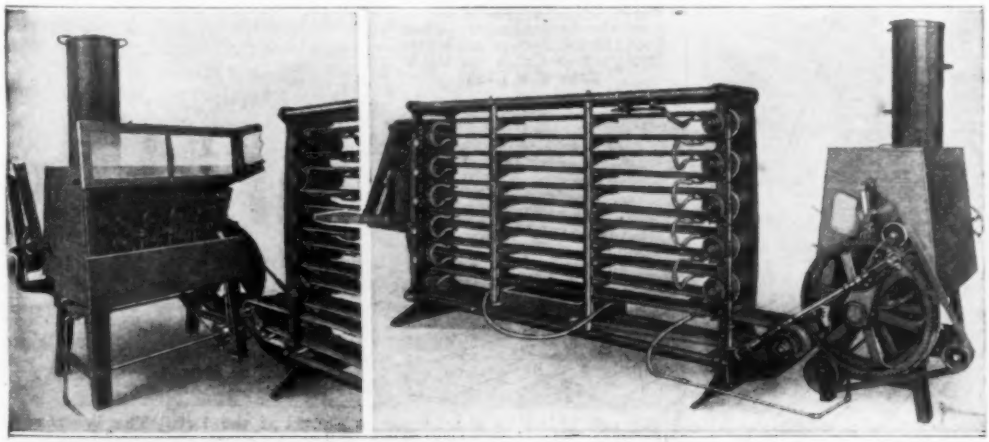
Two Views of the Statue of Liberty Replica Recently Erected in Cadillac Square, Detroit, in Honor of the Men Who have Died in the Great War: The Soldiers' Names are Inscribed on Tablets about the Pedestal of the Figure. The View Above Shows the Vases at the Corners of the Platform from Which, at Night, Steam Issues, Illuminated by Hidden Colored Lights

STATUE OF LIBERTY FEATURE OF DETROIT'S HONOR ROLL

Of the many memorials erected in honor of the men who have died in the war, none is more appropriate than that recently dedicated in Detroit, the central feature of which is a replica of the Statue of Liberty. On the pedestal of the white figure, which rises above a large outdoor rostrum, are inscribed the names of Detroit's heroes. At each corner of the platform are ornamental vases containing colored lights. At night steam is made to issue from pipes, also concealed in the vases and in Liberty's torch, and as the vapor takes on the hue of the lamps, the effect produced is very striking.

NEW STICK-CANDY APPARATUS HAS LARGE CAPACITY

Broad claims are made for the efficiency of a new stick-candy making machine that has a daily capacity of 3,000 lb. The apparatus is supposed to effect a 50 per cent reduction in labor costs, in addition to producing candy that is of superior appearance, and of uniform size, shape, and



Two Views of the New Stick-Candy Machine are Presented Above. The Rack Is the Cooling Device. The Outfit Has a Daily Capacity of 3,000 Pounds and is Supposed to Reduce the Labor Cost by Half

weight. The machine occupies only about a tenth the amount of floor space that is ordinarily required for accomplishing the same work by hand. Every stick is thoroughly cooled before being discharged.

THRIVING DATE ORCHARDS IN ARIZONA

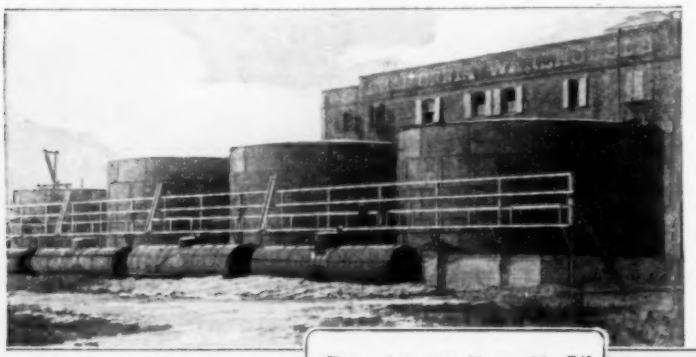
That dates can be made to thrive in Arizona is being demonstrated by the agricultural experiment station of the University of Arizona, whose orchards contain 508 trees, representing 125 different varieties. The fruit is ripened artificially and marketed in the East. Alkaline soil and the available water of the region appear to be well suited to the needs of the date trees, which, it is declared, will bear fruit for 100 years.

¶ It was found recently that bars of pure silver, heated to a certain temperature and left for a time in a strong magnetic field, become weakly but permanently magnetized.

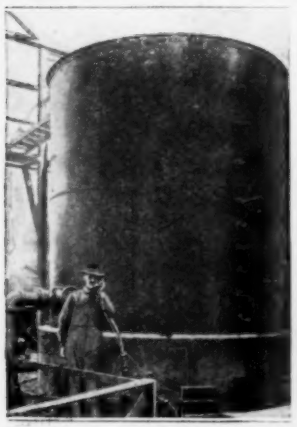
MODEL PLANT FOR STORING VEGETABLE OIL

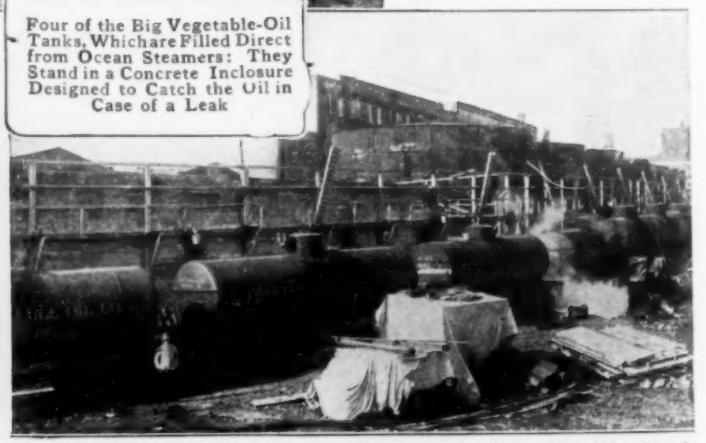
At San Francisco special facilities have been provided for handling vegetable oil, which is now being shipped in great quantities from the Orient for use in a variety of food products, in soap, etc. In the past year, it is estimated, 200,000 to 250,000 tons of this material—much of it coconut oil—have passed through the Golden Gate. One of the new plants for receiving this oil is equipped with a number of immense steel tanks into which the product, after being heated, is pumped direct from the ocean vessels through an 1,800-ft. pipe line. When practically all the cargo has been forced through the pipe, water is injected to clean it out before the oil hardens. The mixture of oil and water is discharged into a special tank, from which the water, on settling to the bottom, is drawn off, while the oil is transferred to another tank. A special telephone line enables a watcher to notify the ship when the pumping should stop.

In each of the storage tanks are 1,900 ft. of steam-pipe coils with which the oil is heated to a fluid consistency, preparatory to pumping it into tank cars for transcontinental shipment. The warmed oil is pumped into a 4-in. main, from which it flows by gravity into the cars, as many as 15 being filled at one time. These cars resemble those used to carry petroleum.

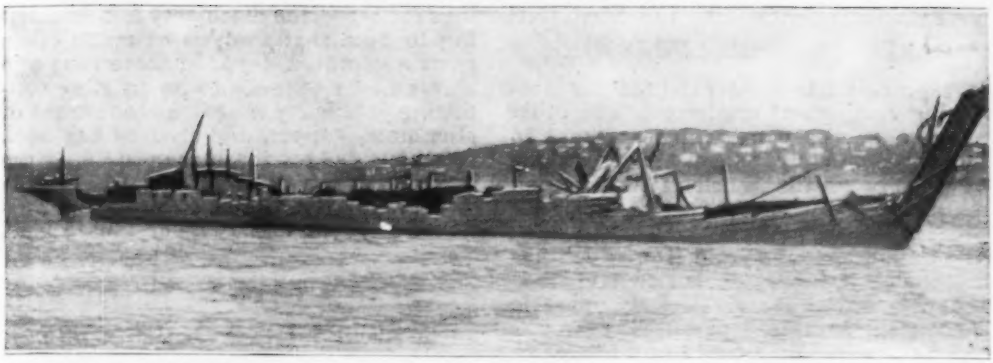


Four of the Big Vegetable-Oil Tanks, Which are Filled Direct from Ocean Steamers: They Stand in a Concrete Inclosure Designed to Catch the Oil in Case of a Leak





The Tank into Which the Mixed Oil and Water is Discharged is Shown at the Left. The Watcher is Telephoning to the Ship. At the Right, Tank Cars are being Filled for Transcontinental Shipment. The Escaping Steam Is from Pipes Used to Heat the Oil to Keep It in a Fluid State for Loading



Charred Hull, Which Is All That was Left of the $110,000 Auxiliary Schooner "Dornfontein," Launched Only a Few Weeks Before It was Torpedoed and Set on Fire by the Germans: In the Condition Shown Here It was Purchased for $5,500

CHARRED HULL OF SCHOONER BOUGHT FOR SMALL SUM

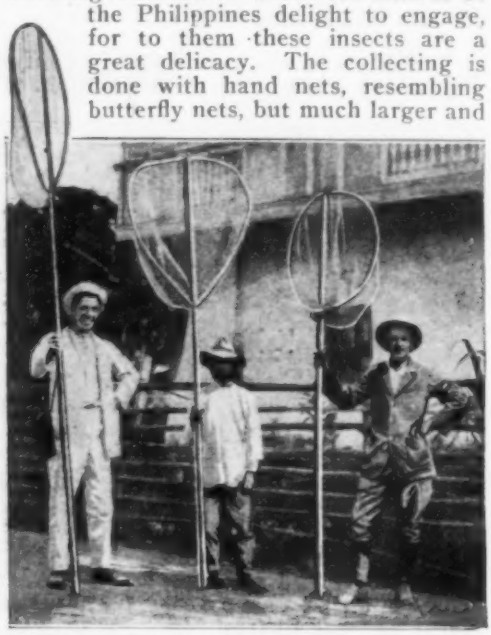
A fine auxiliary schooner, speedily overtaken by war's destruction after its launching at St. John, N. B., was the "Dornfontein," a four-masted vessel, 185 ft. long, which cost $110,000. A few weeks ago it was towed into a Maine port —a charred hull which had been purchased for $5,500. The vessel was launched early in June, and three weeks later, while on its maiden voyage to Africa with 900,000 ft. of lumber, was torpedoed by a U-boat in the Bay of Fundy. The enemy, after removing all valuable supplies, set fire to it. Half of the cargo was consumed and the craft burned to the water's edge. The vessel is being rebuilt and should be ready for rechristening and relaunching early in the summer.

BAGDAD RAILWAY IN POOR CONDITION

The allies, particularly the British, have been much interested in learning something of the condition of that portion of the Berlin-to-Bagdad Railway which lies in Asia Minor. Information obtained since the signing of the armistice shows that the tunnels through the Taurus Mountains, in southern Asia Minor, were opened to broad-gauge traffic last October, and that trains can now run to Neisibin, a point about 100 miles west of Mosul, in Mesopotamia. These tunnels, it is interesting to note, presented unusual difficulties to those constructing them and require inspection daily. While the track for the most part is said to be in good condition, the rolling stock, particularly the engines, was badly in need of repair long before hostilities ceased. Another factor contributing to irregularity of service, even on the western portion of the line, was shortage of coal. It is thought the allies could not build the necessary track and run trains to the Persian Gulf in less than two years.

LOCUST CATCHING A TASK FILIPINOS ENJOY

At a certain season of the year locust catching is a task in which the natives of the Philippines delight to engage, for to them these insects are a great delicacy. The collecting is done with hand nets, resembling butterfly nets, but much larger and having handles, in some cases 10 ft. long. With the return of the locust catchers to town a great fiesta, or feast, is held, at which the insects are eaten.



Men in the Philippines Equipped with Nets for Catching Locusts, Which are Collected in Great Quantities by the Natives during the "Locust Season," and Eaten as a Delicacy

PATENTED PROCESS OF MAKING CASTINGS UNDER PRESSURE

A process has been patented for producing castings of nonferrous and other alloys under pressure which are said to be more dense, freer from blowholes, and to possess greater tensile strength than castings made in sand. One result of the process has been the making of an alloy of aluminum, copper, and iron which has a low coefficient of expansion and, it is believed, will prove particularly valuable for certain aeroplane parts. Larger pistons than any yet produced now appear to be a possibility. By the new method the molten alloys are poured into metal molds and the castings are formed or congealed under pressure. They are described as being, in reality, die castings formed under high pressure. Their structure, it is said, is made up of unusually fine crystals and the material possesses exceptional machining qualities. An automatic machine has been built which turns out several hundred castings per hour.

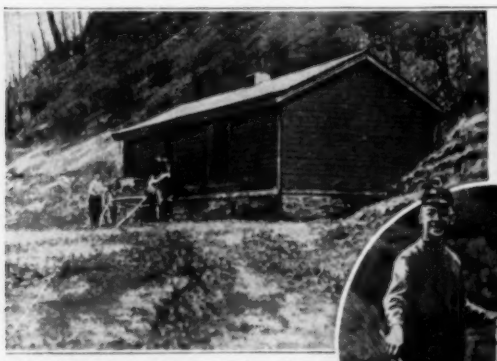
With reference to the making of castings for aeroplane machinery it is interesting to note that analysis of metal taken from a captured Zeppelin some time ago shows that substance to be an alloy containing practically the same proportions of aluminum, copper, and iron as has been recommended for aeroplane pistons by the inventor of the new process. The tensile strength of the German metal was estimated at about 40,000 lb. per square inch.

SEAPLANE, LOST IN DENSE FOG, CRASHES INTO CLUBHOUSE

During a recent flight from Baltimore toward Hampton Roads, the pilot of one of the largest flying boats in use by the navy lost his way on account of dense mist and fog, and was compelled to descend near Norfolk, Va., to learn his whereabouts. On starting to ascend a little later, the big machine crashed into a clubhouse near by which, apparently, the fog had hidden completely from view. Two of the five men in the plane were killed and two injured.

BURNING TONS OF DYNAMITE AN UNPOPULAR TASK

Few persons were desirous of qualifying for the task of destroying 24,000 lb. of dynamite and other high explosives, stored until recently in an abandoned magazine near Sharpsburg, Pa. The unpopularity of the job was increased by the fact that a previous attempt to burn the explosive had resulted in detonations so violent that the experimenters fled. Finally an expert was employed who carefully opened each box with a wooden wedge and mallet and examined the contents. In most cases he found that the material could be destroyed by dumping it on the ground, saturating it with oil, and then lighting it with a fuse that permitted withdrawal before explosions took place. In other cases the dynamite was so badly decomposed that burning was not advisable, and chemical treatment had to be used in order to dispose of it.



This Structure Came to be Considered a Menace Because of 24,000 Pounds of Explosives Stored Here

It's All in Knowing How. This Expert, with Wooden Mallet and Wedge, Was Not Afraid to Open the Dynamite Boxes

Removing the Menace by Burning the Greater Part of the Explosives: A Portion was Destroyed Chemically

PORTABLE PHONE EXCHANGES FOR EMERGENCY USE

For emergency purposes many telephone companies are adding to their equipment motor vans in which are installed switchboards and other apparatus necessary for a telephone exchange equal to the needs of a community of 25,000. When a fire, or other catastrophe, puts a local exchange out of commission, one or more of these trucks is rushed to the scene and telephone service is quickly restored, it being only necessary to connect up with the trunk lines. In cases where a fire has destroyed an entire town, outfits of this character have been invaluable in putting the distressed community in touch with the outside world. Portable exchanges in use in France are said to have suggested the idea to American telephone engineers.

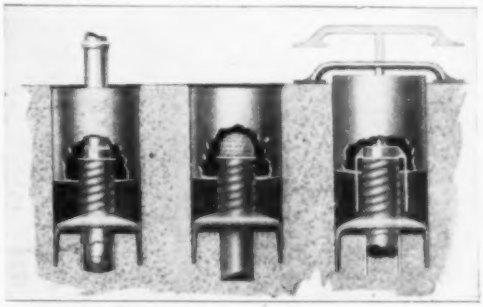
Automobile Trucks, Equipped as Telephone Exchanges, Which can be Quickly Connected to Trunk Lines, to Take the Place of Any Local Exchange Which has been Put Out of Commission by a Fire or Other Catastrophe

SERIOUS CORN PEST APPEARS IN EASTERN STATE

Because of a pest which has appeared in the corn in a certain section of eastern Massachusetts, the secretary of agriculture has placed that region under quarantine, forbidding the interstate shipment of cornstalks, corn on the cob, corn fodder, etc., from the section, if it is infected. The pest is known as the European corn borer, and is regarded as more to be dreaded than the army worm. It is described as a slender, dirty-white or pinkish, naked caterpillar which burrows into the stalks. The only practical way of destroying these creatures is said to be by burning the cornstalks, garden vegetables, grass, etc., where they seek refuge in the fall.

ADJUSTABLE HOLE RIMS FOR GOLF COURSES

A pressed-steel hole rim for golf courses is so designed that it keeps the balls from falling into mud that may accumulate at the bottom, and can be readily adjusted to the desired height by turning a removable key, furnished with the outfit. Within the cup, which forms the rim proper, is a small cylinder, with threaded surface which fits into a hole in the bottom of the cup, and into the upper end of which the ball falls. The threads referred to cause the cup to rise or descend when it is turned. Steel shoes are provided which can be attached to the iron or bamboo markers so that they fit snugly in this inner cylinder. In this way pointed rods that cut up the putting greens are eliminated.



Three Views of Adjustable Hole Rim: One at Left is Holding a Marker, and Center One a Golf Ball, While the One at Right is Fitted with Adjusting Key

BY COURTESY OF THE NEW YORK EVENING WORLD

GREAT NEW YORK SQUARE NAMED FOR PERSHING

WHAT undoubtedly will be the most imposing group of modern hotels in the world, when the contemplated structures are finished, has as its center the Grand Central Terminal of New York City. Three of the hostelries have been finished for some time and one is just completed, while plans for the fifth, and in some respects the most splendid of the group, have been placed in builders' hands. These towering structures overlook a large breathing space in the heart of the city, which was recently named "Pershing Square." The fact that four subways and tunnels pass beneath the square indicates the importance of this metropolitan center. In front of the terminal is being constructed a great viaduct that will connect upper and lower Park Avenue.

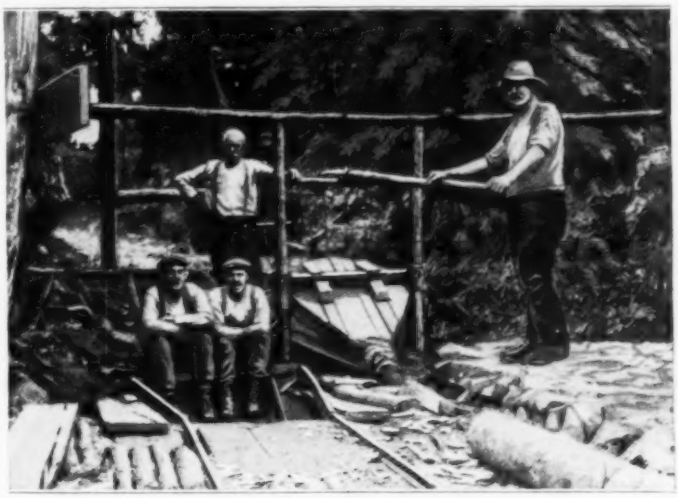
COST OF WORLD WAR PLACED AT TWO HUNDRED BILLION

According to estimates prepared by the Federal Reserve Board and believed to be substantially correct, the aggregate direct expense incurred by the several belligerents in conducting the war, up to May 1, last, amounted to about $175,000,000,000. It is thought that the total sum spent up to the first of this year approximates $200,000,000,000. The public debt of the chief allied nations, May 1, is placed at about $105,000,000,000. The conduct of the war apparently cost the allies more than twice as much as it did the central powers, for the aggregate debt assumed by the latter up to the date mentioned is computed at $45,000,000,000. In this connection it is interesting to note that the antebellum debt of the seven chief belligerents amounted to only $25,000,000,000. The annual cost of supporting this was about $1,000,000,000, but the yearly burden hereafter, embracing interest and sinking fund, will probably be in excess of $10,000,000,000. Germany's per-capita burden is approximately three times greater than that of the United States for funds already expended, and obviously will be greater than that when the reconstruction obligation is shouldered. For instance, the United States, with a population of 110,000,000, has a national wealth of $250,000,000,000 with which to pay the $18,000,000,000 war debt already contracted. Germany, however, has 66,000,000 population and $80,000,000,000 wealth with which to meet its $35,000,000,000 war debt, represented chiefly by bonds held within its own country. In conclusion, it is worth noting that the cost of "putting on" a modern four-year world war is about equal to the entire national wealth of the United States.

¶The British have ordered the construction in this country of 20,000 tanks of moderate size, regardless of the return of peace. The machines are so designed that they can be used as farm tractors, if desired.

FORCE AIR DOWN MINE SHAFT WITH BLACKSMITH BELLOWS

Fresh air being urgently needed in a coal mine in British Columbia, and there being no suitable ventilating apparatus available, a bellows was obtained from a blacksmith shop and rigged up for use in the emergency. A framework of poles supported it and furnished a leverage for operating it. The miners worked the big bellows in shifts, sending fresh air to their fellows down the shaft by pipe line.



Bellows Installed at the Mouth of a Mine Shaft in British Columbia, with Which Fresh Air was Forced Down to the Miners: The Man at the Right is Taking His Turn Operating the Bellows

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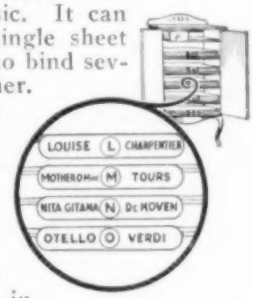
HANDY INDEX ATTACHMENT FOR SHEET MUSIC

An index tab on which a title and a composer's name can be written has been devised for the convenience of users of sheet music. It can be attached to a single sheet or used in helping to bind several sheets together. Between the space for the title and the space for the composer is a circle for the index letter or number. The tabs are supplied in three colors—a further aid in making it easy to find any selection, by permitting classification according to whether the music is vocal, orchestral, or a band selection.



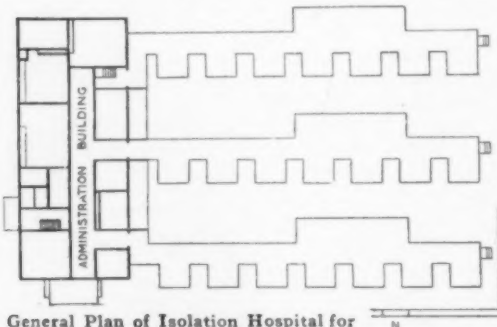
MACHINE FOR PRACTICING GOLF INDOORS

Golf practice which is genuinely helpful in developing the player's skill can be obtained at home, on shipboard, on the roof of an office building, or elsewhere, by using a new golf machine. The ball is placed on a mat, or pad, and when struck, slides up a taut, inclined wire, to which it is fastened by a suitable eyelet. At the far end of the wire it strikes a padded head, or buffer, which is connected by levers with a swinging foot suspended at one side of the machine. The impact of the ball against the head causes the foot to strike a second ball, sending it up an inclined trough, graduated in terms of yards. The distance this second ball travels indicates quite accurately the distance the same stroke would have sent the ball on a regular course.

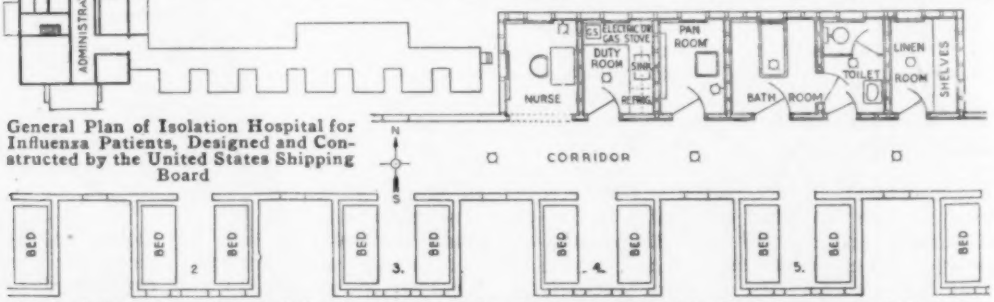
A Machine Which Permits Indoor Golf Practice and Measures the Strength of the Player's Stroke: The Ball Which the Player Has is Fastened by an Eyelet to a Wire, along Which It Slides, Striking the Head at the Upper End. Impact with the Latter Actuates a Lever, Which Sends a Second Ball up the Inclined Groove

"CUBICLE" HOSPITAL EMPLOYED IN FIGHTING INFLUENZA

In combating the influenza among several thousand apprentices training for the merchant marine, medical officers of the United States Shipping Board evolved a system of treatment that effectively checked the disease and reduced mortality. Fresh, cool air and sunshine were the chief healing elements employed. A special hospital of unusual design was constructed on an elevation. Its arrangement was governed by the desire to isolate the patients and give them abundant sunlight and air. Stretching at right angles from the administration building, a series of long pavilions was built. Each of these consisted of a steam-heated corridor giving access to a succession of "cubicles," or "bays," facing south. The separate compartments were made large enough to accommodate two beds and leave an aisle between them. To prevent transmission of germs from one patient to another, a sterilized sheet was suspended so as to divide the room. The roof of each cubicle was hinged so that one-half of it could be tilted back, opening the interior to air and sun. One of the walls consisted of a glazed sash, hinged so as to be swung outwardly. An



General Plan of Isolation Hospital for Influenza Patients, Designed and Constructed by the United States Shipping Board



Detail of One Wing of the Isolation Hospital, Showing the Bays, or "Cubicles," All Having South Exposure, and the Arrangement of Attendants' and Utility Rooms on the Other Side of the Corridor

air space, a foot in depth, was also left around the top of each cubicle between its walls and the roof. The plan worked so well that it received the indorsement of Massachusetts medical authorities, who adopted it in checking the epidemic among the civilian population.

CANADA'S HUGE CENT PIECES TO BE DISPLACED

The big Canadian cent, which has been as much of a joke to Americans as the latter's huge silver dollars have been to their northern neighbors, promises to disappear in the course of time. It is announced that the Dominion is about to mint a one-cent piece which will be slightly larger than the Canadian dime. This would indicate that it will be about the size of the cents used in this country.

FIRST HORSEBACK PARTY ASCENDS MOUNT ADAMS

Formerly it was thought the summit of Mt. Adams, in the Columbia National Forest, which rises to a height of 12,307 ft., could be reached only on foot. But recently a forest ranger and his wife, mounted on sharp-shod horses, began the ascent at seven in the morning and reached the top at three in the afternoon, their animals negotiating the snow fields

This Man and His Wife, Riding These Horses, Recently Ascended to the Summit of Mount Adams. They are Believed to Be the First to have Ridden on Horseback to the Top

without serious difficulty. Special local interest attaches to the feat because a club in Portland, Ore., is composed exclusively of persons who have climbed Mt. Adams or some other peak whose summit is considered accessible only on foot. Thus, technically, the status of some members has been brought in question.

TRENCH GUN IS RIOT PIECE FITTED WITH BAYONET

America's superatrocity, the use of the sawed-off shotgun, called forth such a chorus of whines from the "sportsmanlike" Hun that it will no doubt receive the notice it deserves when the history of the nation's military efforts is eventually written. Therefore, a little light on the story of its adoption may not be amiss even at this time. The idea was first suggested to the War Department by a Georgia engineer. It immediately met with General Pershing's approval, and resulted in the adoption of a standard 12-gauge, six-shot riot gun.

A perforated steel jacket, designed to fit over the barrel and carry the bayonet, was added to the piece. The ammunition used consisted of cartridges containing three and a half drams of smokeless powder and nine pellets, each about the size of a .32-caliber bullet.

Close View of the American Trench Gun, Otherwise a 12-Gauge Riot Piece Fitted with a Perforated Steel Jacket and Hun-Hating Bayonet

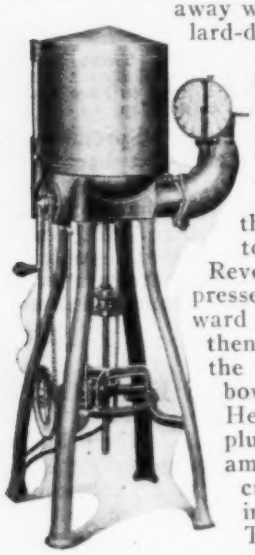
The weapon was never expected to replace the rifle or accomplish the work of the machine gun. It was intended particularly for night work at close range. Even an expert marksman cannot easily make a hit in the dark with a rifle when a slight sound is his only target. But the average trapshooter can come dangerously near killing some one with a sawed-off shotgun if given a chance. And so it was with our sentries. After the shotguns were distributed among them, men on guard duty at night began reporting hits. And Fritz began complaining about our barbaric tactics.

In use, the trench gun proved even more effective than had been expected. It was found that by firing from the hip, holding back the trigger, and pumping, a veritable

barrage effective for 100 yards or more, could be laid down. Also it was found that soldiers who had shot clay pigeons in peace time could play pranks with grenades hurled from the Hun's trenches. That is, their well-aimed shots frequently checked grenades, causing them to fall and explode on the German side of "No Man's Land."

LARD-DISPENSING MACHINE SAVES TIME AND MONEY

Guesswork and waste resulting from retailing lard in small quantities are done away with by using a new lard-dispensing machine.



A 50-lb. pail of lard is placed, inverted, in a chamber supported by a standard, and by turning a crank, a plate is forced up through the lard to the bottom of the can. Reversing the crank presses the lard downward into a conveyor and thence into a cup at the upper end of an elbow-shaped passage. Here it actuates a plunger, causing the amount of lard in the cup to be accurately indicated on a dial. The cup can be emptied by swinging it to one side and forcing the plunger back to its former position.

STATIC INTERFERENCE IN RADIO COMMUNICATION ELIMINATED

What is considered to be one of the most important scientific discoveries of recent years has been announced by the Marconi Wireless Telegraph Company. Static interference, the perplexing condition that has been encountered in radio communication, has been overcome after years of effort on the part of the chief engineer of the Marconi company. Wireless equipment can now be used 24 hours a day, 365 days in the year, instead of only during periods of favorable atmospheric conditions.

By static is usually meant the uncontrolled electricity present in the atmosphere. At times it produces so much noise in the receivers that it renders radio signals indistinguishable, and thereby prostrates service.

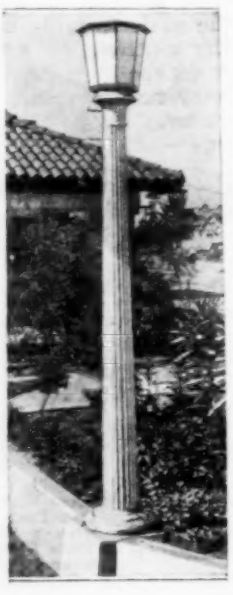
The new invention, the outgrowth of discoveries made by the engineer, not only protects receiving apparatus from the effects of transient electricity, but also prevents waves sent out by one station from interfering with those of another. Furthermore, it makes unnecessary the erection of enormous towers for the receiving antenna. Aerials need be strung no higher than ordinary telegraph wires.

All was ready for announcement of the invention when the United States entered the war. Instead of being made known, however, it was placed at the disposal of the government. The Navy Department put it in use immediately and caused its adoption by the allies. During the war it did valuable service.

Technical details of the invention are still withheld. The inventor, however, has remarked that he worked on the theory that static electricity, contrary to the belief of many engineers, followed definite laws. His invention, it is contended, has removed the chief obstacle that has stood in the way of universal commercial extension of wireless telegraphy. Also, it will no doubt hasten the development of wireless telephony.

EIGHT-PANEL STREET LAMP PREFERABLE TO A GLOBE

The especially attractive street lamp shown herewith is preferable, it is claimed, to various types of globes, for when one of the latter is broken, to replace it costs several dollars, in addition perhaps to the cost of another light bulb, while injury to this lamp usually involves but one or possibly two of the eight panels, which can be replaced for about 50 cents each. The top, which slopes slightly toward the sides from the center, serves to reflect the light downward, while many globes tend to throw more light upward than down.

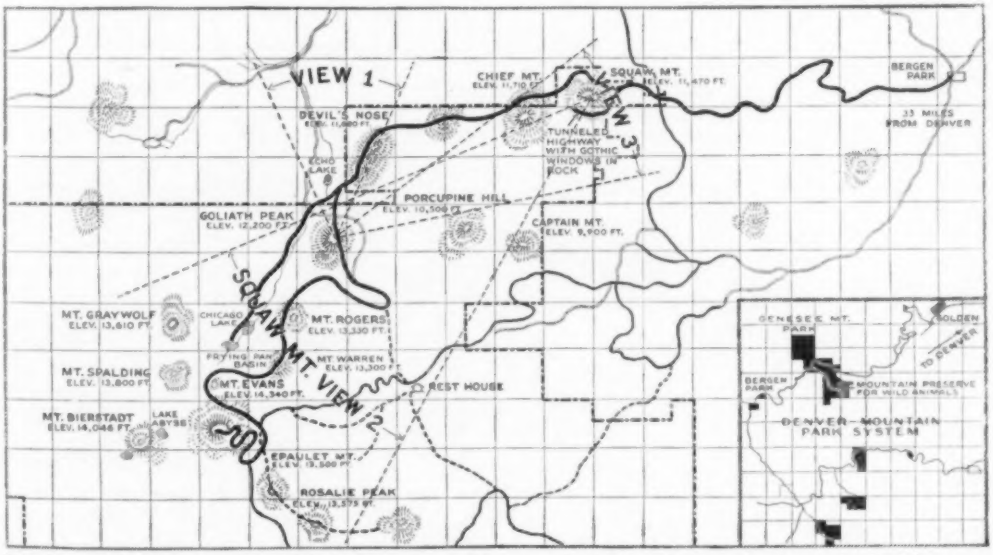


This Magnificent View is Obtained from the Lower Hairpin Turn on Lookout Mountain, in Colorado, Where the Road to Mount Evans Begins to Wind among the Mountains. In the Middle Distance Is the City of Golden, "the Portal of the Plains"

A MOTOR ROAD ON THE SKY LINE OF AMERICA

By J. E. MURPHY

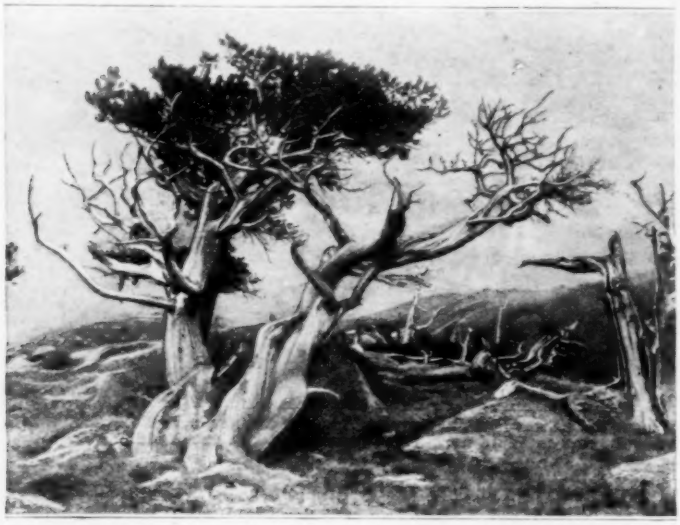
MAKING easily accessible fastnesses of the Rocky Mountains that can now be reached only by persons hardened to mountain travel, the automobile road planned and already partly built by the city of Denver, Colo., to connect the heart of that city with the summit of Mount Evans, will be one of the most remarkable mountain highways in the world. With a mile-high start at Denver, the road will wind over titanic peaks and through chasms of the roughest and most picturesque part of the Colorado Rockies, making a clear rise of 9,000 ft. in 65 miles, and terminating on a summit that is higher than Pikes Peak. Over the westerly 10 miles of its course it will follow the sky line of mountains that rank in height with the peaks of the continental divide. From end to end it will be a thoroughly prac-



The Route of the Motor Road Which Is to Be in Effect an Extension of Denver's Mountain Park System: The Highway will Wind over Titanic Peaks and through Picturesque Chasms, Making a Rise of 9,000 Feet in 65 Miles, with Grades That Nowhere Exceed Six Feet in One Hundred Feet

tical automobile road, 20 ft. in width, with grades that nowhere exceed 6 ft. in 100 ft.

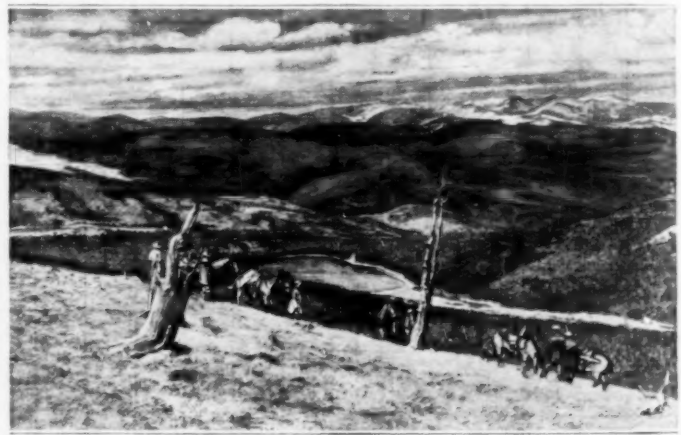
The entire project is estimated to cost about $750,000. Although a big undertaking in itself, the construction of this road is in effect an extension of the Denver mountain-park system, which has been developed in the past five years. These mountain parks, seven in number, are connected with the city by a 65-mile circle drive, 27 miles of which is in the mountains. They have a total area of about five square miles and are scattered over an area of approximately 100 square miles.



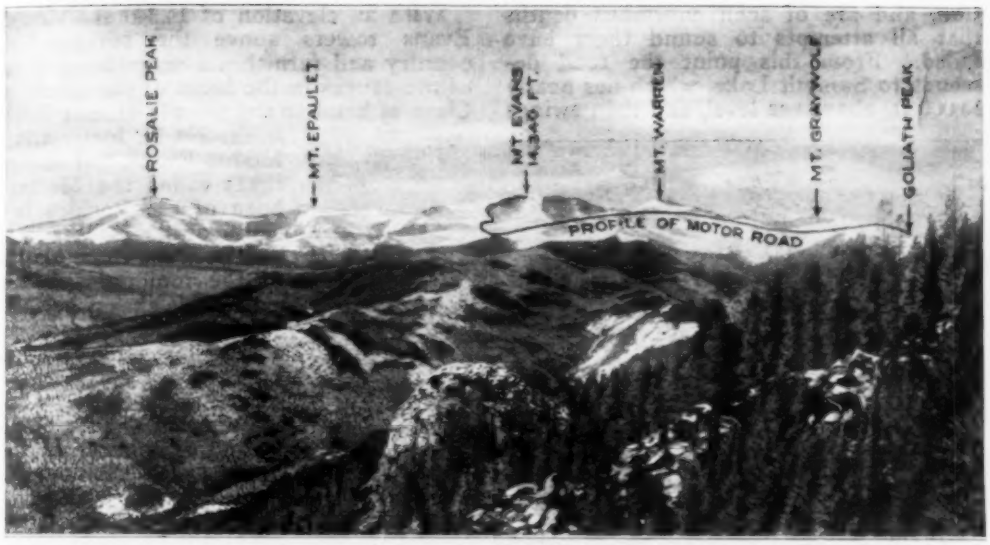
An Example of the Grotesque "Elfin Wood" Found at the Timber Line: These Trees Show the Effect of Mountain Storms

The Mount Evans road proper begins at Bergen Park, 33 miles from the city. The mountain-park district lies east and southeast of Bergen Park, while the Mount Evans road strikes straight west from this point into the heart of the Rockies. Two gateways give access to the mountain parks as well as to the Mount Evans road. One of these is at Golden and the other at Morrison, the latter being the entrance to Bear Creek Valley. The northern route, passing through Golden, is the direct road to Mount Evans. It is on the road from Golden to Bergen Park that the city of Denver has established a mountain preserve for the wild animals of the zoo, conducting an experiment that is attracting nation-wide attention. In a 400-acre tract, inclosed by a woven-wire fence 10 ft. high, are small herds of deer, antelope, elk, and buffalo, all living in a wild state and thriving because of this return to their natural environment. The experiment which has proven so successful was described in Popular Mechanics Magazine for December, 1917. The tract is located on the slope of Genesee Mountain, and can be reached over three automobile roads.

A nine-mile section of the Mount Evans road extends from Bergen Park to Soda Pass on Squaw Mountain. The length of the road from Soda Pass to the summit of Mount Evans is about 19 miles. The entire line has been surveyed and located, and it is planned to build additional sections from year to year as funds are available. From Soda Pass the main road will swing around the north slope of Squaw Mountain, while one of the two scenic detours that form part of the project will branch off the main road on the northeast slope of Squaw and will follow the precipitous south slope of the mountain. Over a part of this detour the road will be tunneled through the solid rock, and will be lighted



The Continental Divide from Goliath Peak, as Indicated by "View 1," Marked on the Map on the Preceding Page: In the Foreground Is Echo Lake, While the Slope of Devil's Nose Is at the Right



Sky-Line Drive along Mount Evans Range as Seen from Squaw Mountain, around Which the Road Passes: The Sector Marked "View 2," of the Map on Page 231, Shows the Scope of This Marvelous Panorama. The Summit of Mount Evans, the Terminus of the Drive, Rises to an Altitude of 14,340 Feet—Higher Than Pikes Peak

by Gothic windows cut in the face of the cliff, a feature that is unusual in this country, although it has been used to a limited extent in Europe. This detour will be a trifle more than a mile in length.

After leaving Squaw Mountain, the route lies along the slopes of Chief Mountain, Warrior Mountain, and Devil's Nose, passing along the shore of Echo Lake, which is two miles above sea level, and climbing to timber line just below the summit of the rounded dome of Goliath Peak. From Echo Lake the second scenic detour branches off the main road, following four miles up Chicago Creek to the two Chicago lakes. Timber line in Colorado is at an elevation of 11,500 ft., and from Goliath Peak to the end the road is nowhere below this altitude. A curious feature of tree life, found only at timber line, is the so-called elfin wood. These trees, which seem more dead than alive, are mainly Engelmann spruce and flexible pine, and their grotesque shapes and attitudes are due to the hard conditions under which they grow — particularly to the high winds that prevail at this altitude.

A Cliff on the South Side of Squaw Mountain Which will be Tunneled for the Scenic Detour: The Tunnel will have Arched Windows, through Which the Valley Below can be Viewed

Beyond the summit of Mount Rogers the road emerges suddenly on the brink of a 2,000-ft. precipice, from which the traveler looks straight down into the depths of the Frying Pan Basin, a gigantic natural amphitheater inclosed on three sides by cliffs from 1,200 to 2,000 ft. high. In the bottom of the Frying Pan lie the two Chicago lakes, which are reached by the detour that starts at Echo Lake. These lakes are at about 12,000 ft. eleva-

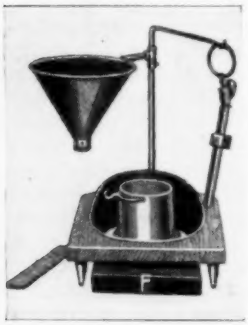
tion, and are of such enormous depths that all attempts to sound them have failed. From this point the road descends to Summit Lake, which lies nearly 13,000 ft. above sea level, and then swings to the east side of Mount Evans, climbing to the summit of this peak by a series of hairpin turns.

How the Comfort of Travelers is Provided for in the Bear Creek Valley: Connected with Each Shelter Is an Open-Air Oven with a Double Fireplace

With an elevation of 14,340 ft., Mount Evans towers above the surrounding country and furnishes a magnificent view of the ranges in the heart of the Rockies. Close at hand to the west is Mount Bierstadt, 294 ft. lower than Mount Evans, but sometimes called the Matterhorn of the Rockies because of its inaccessibility. Between these giants of the mountains is an impassable chasm 2,000 ft. deep, in the bottom of which lies Lake Abyss. There are more than 50 lakes in the Mount Evans district, and many of these are visible from the summit of the mountain. To reach the peak now requires an arduous trip, mainly by horseback, over difficult and dangerous trails, with the necessity of a camp over night on the way. With the automobile road completed, it will be possible to make the trip from Denver in comfort in barely more than two hours.

DEVICE FOR FILLING GRAIN TESTER UNIFORMLY

For ascertaining the weight per bushel of grain, dealers commonly weigh a pint, or more, and make computations from the result obtained. But the manner of filling the measure often produces varying results because the grain is not always uniformly packed. To secure uniformity in weighing, an outfit for weight-per-bushel testers has been put on the market. It provides a funnel of a certain size, suspended 2½ in. above the measure by means of a swinging arm, and through it the grain is poured, whereupon the funnel is swung to one side, and a second support, to which a scale beam is fastened, is brought into position. The weighing is done after all grain heaped above the brim has been struck off. Surrounding the measure is a wooden base with a circular metal guard which catches the surplus grain and discharges it into the pan in which the measure stands.



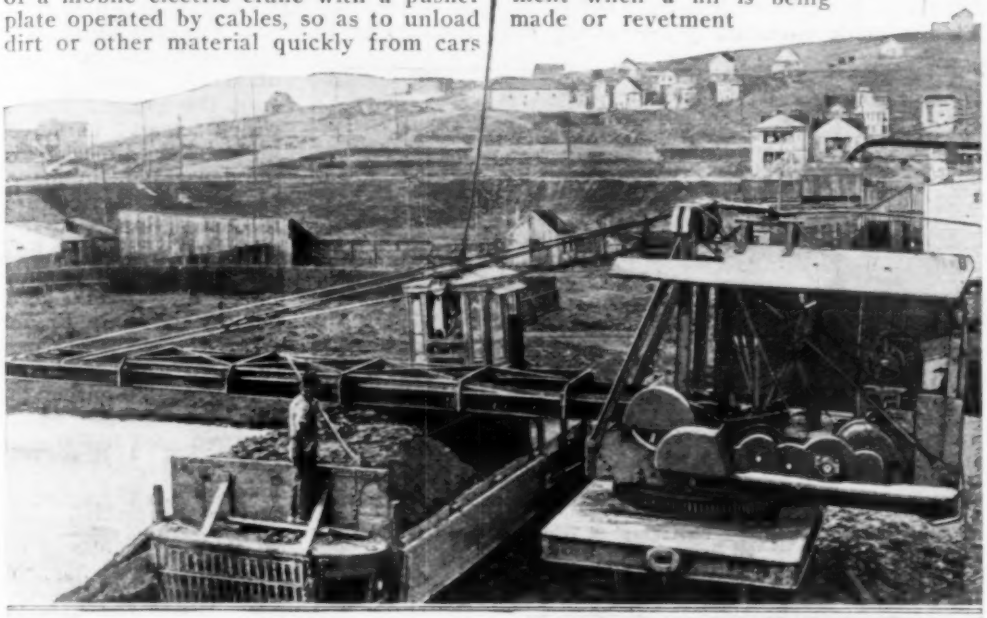
YANKEE AIRMEN OUTFOUGHT HUN NEARLY FOUR TO ONE

Nine hundred and twenty-six German aeroplanes and 73 balloons were destroyed by American airmen during their brief participation in hostilities. Yankee losses totaled 265 planes and 38 balloons. Between September 12 and the final day of fighting, our air forces dropped 120 tons of high-explosive bombs on and behind the enemy lines. When the armistice was signed, America had 740 planes, 744 pilots, 457 observers, and 23 aerial gunners in action. Three hundred and twenty-nine of the planes were of the pursuit type, 296 were for aerial observation, and the remainder consisted of bombing machines.

¶Several of the converted yachts purchased by the government to fight the U-boats have recently been allotted to the Coast and Geodetic Survey, the Lighthouse Bureau, the Bureau of Fisheries, and the Coast Guard.

STREET-RAILWAY CRANE UNLOADS CARS OF DIRT

In one of the western cities a surface-traction company has equipped the boom of a mobile electric crane with a pusher plate operated by cables, so as to unload dirt or other material quickly from cars inclined and the pusher employed to distribute the pile evenly on the embankment when a fill is being made or revetment



With the Boom Lowered at Right Angles across a Car, as Shown Above, the Pusher Plate is Drawn Forward and Backward, Scraping a Sixth of the Load over the Side with Each Complete Operation

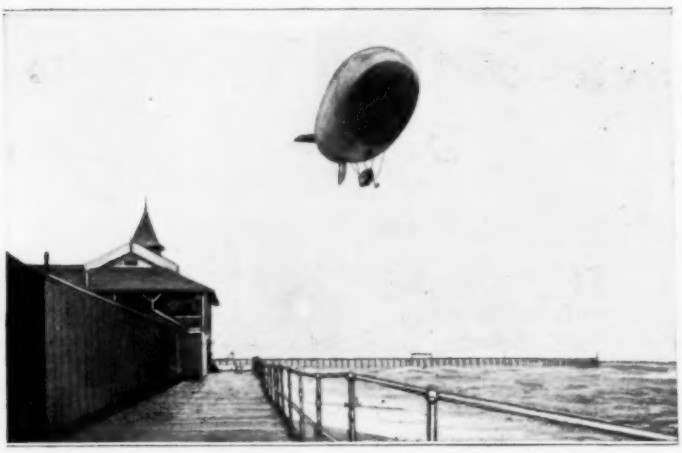
This Shows How the Equipment may be Used to Distribute a Pile of Dirt, or Refuse, on an Embankment After Several Cars have been Unloaded. In This Way the Work is Accomplished Quickly and with a Considerable Saving of Labor

run alongside. As a car is brought up, its hinged sides are dropped and the boom is lowered across it at right angles. The pusher is then drawn forward and backward across the car, discharging a sixth of the load with each complete operation. After several carloads of dirt have been dumped in this manner, the boom may be work executed. Obviously the machine saves considerable time and much labor.

¶ Camouflage coats are disappearing from ocean vessels, each craft now coming from the ways being painted a color designated by the government.

YANKEE DIRIGIBLES DID PART IN GUARDING COASTS

Much of the burden of patrolling our harbors and coast lines during the war fell to the lot of American-built dirigibles. This is made particularly interesting because of the fact that before our participation in the hostilities, our navy possessed exceedingly few lighter-than-air ships. It was only slightly more than a year ago that government requirements were exceeded by a comfortable margin in the official tests of the first group of flexible dirigibles under construction for the Navy Department. The vessels, which have proved satisfactory in service, are of the same type that has been used almost exclusively in England and France, and are popularly known in the former country as "blimps."



An American-Built "Blimp" Photographed While on Coast-Patrol Duty off Belmar, New Jersey

CORNCOBS MAY BECOME SOURCE OF REVENUE FOR FARMER

A possible new source of revenue for the farmer is brought to light by the discovery of Department of Agriculture chemists that glue, cellulose, and glucose can be obtained from corncobs—one of the great waste products of the corn belt. The investigators believe that here is a chance for the development of a profitable industry, but point out that to put it on a commercial basis will require a large and costly plant.

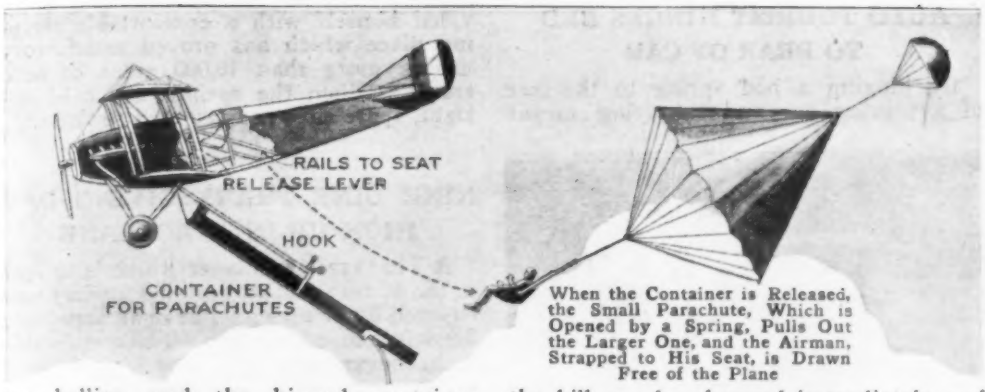
¶The French Academy has awarded a gold medal to the American Red Cross for "admirable work."

RECOVERED WHEAT FIELDS HARVESTED BY FRENCH

That a successful offensive in modern warfare often means much besides fighting is shown by the fact that during the months of July and August allied forces recovered 137,000 acres of wheat from the enemy, the greater part of which was harvested under the direction of the department in charge of French agricultural reconstruction. In the zones of 16,555 acres held by the Fourth French Army and 18,217 acres held by the Sixth French Army the work was particularly rapid and well managed. To gather the wheat from the entire area required 16,900 men, 3,300 horses, 823 binding machines, and 9,800 scythes or sickles. The binders were furnished by the French authorities, which also supplied over 100 new threshing machines. When the harvesting and threshing was completed, all this equipment was sold at reduced prices to the farmers or groups of farmers who have been victims of the war. The rescue of this wheat shows that the Germans retreated so hastily that they had not time to destroy all in their path.

AEROPLANE PARACHUTE HAS NOVEL FEATURES

Aeroplane parachutes received considerable thought in America during the war, and several interesting inventions resulted. Among these there is one that seems sufficiently novel to warrant notice, even though it apparently failed to gain the approval necessary for its adoption. A double parachute is carried in a container beneath the fuselage and connected to the pilot's seat, which is so arranged that it is drawn rearward and downward through the body, carrying the airman with it, when the parachute is released and allowed to open. The parachute proper has connected to it a small parachute of the umbrella type which is opened by spring action. When it is ejected, it catches the air instantly and draws the large one after it. As the lat-



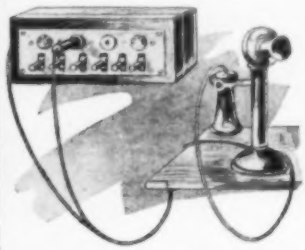
When the Container is Released, the Small Parachute, Which is Opened by a Spring, Pulls Out the Larger One, and the Airman, Strapped to His Seat, is Drawn Free of the Plane

ter bellies, and the hinged container swings forward out of the way, the seat, in which the pilot is strapped is drawn out. Although the invention embodies features of questionable merit, the general scheme, at least, is interesting.

LOUD-SPEAKING TELEPHONES USED IN MOVIE THEATER

One large moving-picture theater in Chicago is equipped with loud-speaking telephones connected with the manager's office. They serve, to all practical purposes, the function of dictaphones. Their province is to convey the audience's verdict of a photoplay to the manager. The theater is one which runs multireel pictures and bills them for a week's stand. Obviously, therefore, it is of importance to know the public's decision on the first night of a run, so that, if it is unfavorable, the bill can be changed immediately and the house filled on the following evening. The loud-speaking telephone scheme was adopted to make this possible, and according to the claims of the management, it has saved thousands of dollars. Transmitters are concealed in the aisles of the theater and in the lobby. A switchboard at the manager's desk enables him to "plug in" on any part of the house and listen to what is said. As a rule moving-picture goers will express their opinions of the show when departing.

The Switchboard Enables the Manager to Make Connections with Any of the Transmitters



Lobby of Moving-Picture Theater with Telephone Transmitters Concealed in Convenient Places, Which Enable the Manager of the Show to Overhear Any Expressions of Criticism or Praise of the Performance from the Patrons: Similar Transmitters are Also Installed in the Aisles of the Auditorium. At the Right Are Shown the Switchboard and Telephone Used in the Manager's Office

AUTO TOURIST HINGES BED TO REAR OF CAR

By hinging a bed spring to the rear of a touring car and supplying means for holding it in a vertical position when not in use, a western motorist has provided himself with a comfortable sleeping place which has proved satisfactory during more than 10,000 miles of auto travel. When the springs are held upright, spare tires are fastened to them.

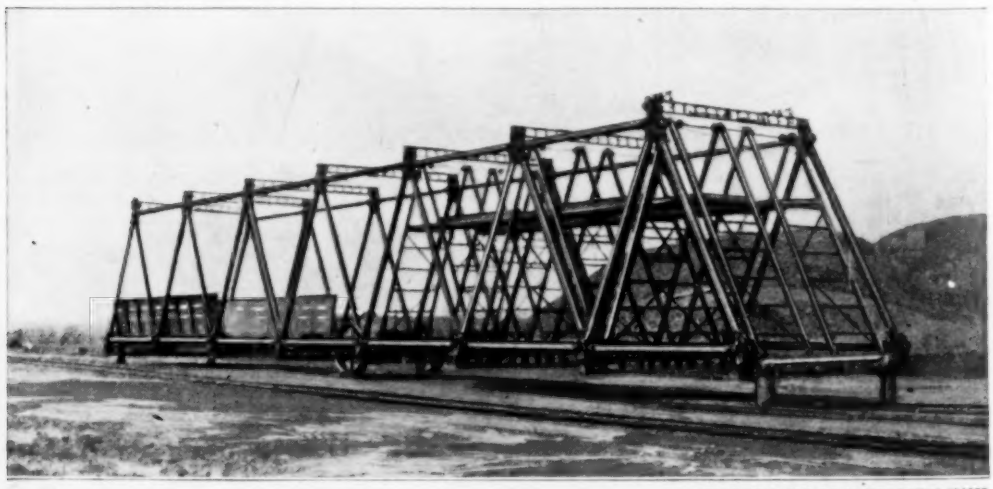
Rather Than be Troubled with Folding or Collapsible Beds for Overland Touring, This Motorist has Hinged a Bed Spring to the Rear of His Car

NINE DINE THANKSGIVING DAY HIGH UP IN AEROPLANE

A Thanksgiving dinner which is unique in the history of that national holiday was enjoyed by nine men while in an aeroplane 2,800 ft. above the earth. The memorable flight began from the new landing field of the aerial-mail service at Elizabeth, N. J., and the machine used was one built for the New York-Chicago mail delivery. Owing to bad weather conditions the meal lasted only 22 minutes, but that was sufficient time for serving roast turkey with dressing, a variety of vegetables, and dessert.

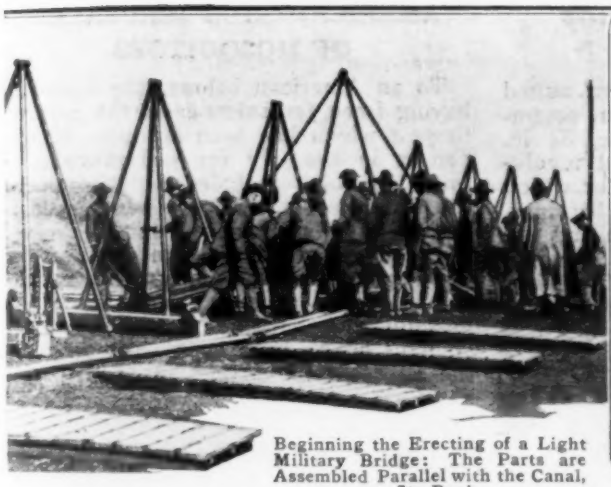
ARMY ENGINEERS LEARN SPEED IN BRIDGE BUILDING

That nothing which can possibly be foreseen is left to guesswork in modern warfare, is demonstrated by the work which was done in our army engineering school in France. The instruction covered the building of bridges, construction of dugouts, the placing of wire entanglements, camouflage work, sound ranging, interpretation of aerial photographs, etc. Time was a vital factor in all this training, and to get results most quickly, much of it was given in the field under conditions closely resembling actual warfare. As far as possible, operations were standardized, and each man learned to do certain tasks almost automatically. A well-trained company was able, for example, to assemble a steel footbridge and place it over a 50-ft. stream in less than eight minutes. In building trenches, the pupils solved all the problems met with at the front, such as providing proper drainage, the placing of concealed observation posts, and many other difficult tasks.



BY COURTESY OF THE ENGINEERING NEWS RECORD

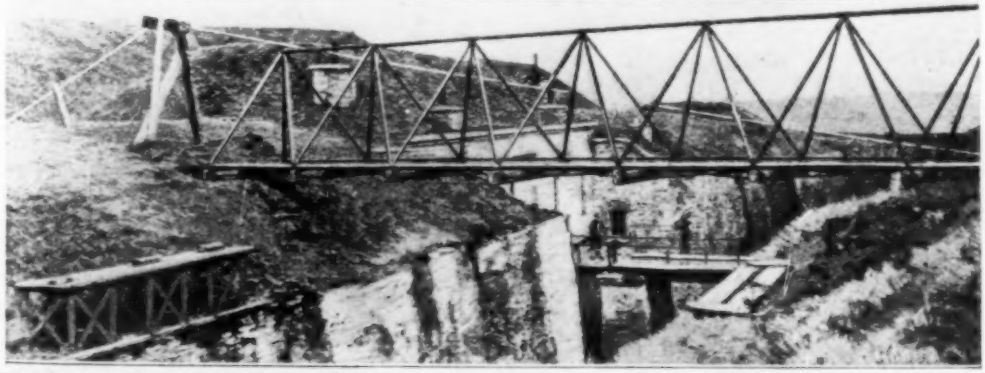
Heavy Bridge Which American Boys in the Army Engineer School in France Learned to Construct in Quick Time: The Wheels in the Center are Employed in Rolling It into Position



Beginning the Erecting of a Light Military Bridge: The Parts are Assembled Parallel with the Canal, on Its Bank

This Picture was Taken But a Few Minutes Later Than the One at the Left. Already a Considerable Length of the Structure has been Assembled and the Two-Wheel Truck, Hidden behind the Two Men at the Right, Is in Place

The Bridge was Finished in Such Quick Time That the Photographer had to Hurry to Change His Plates Fast Enough. Here the Men are Shown Swinging It Around into Position, Preparatory to Thrusting It across the Canal. This Practice in Acquiring Speed Is of the Utmost Importance, for Bridges of This Type Often must be Constructed under Fire



The Structure Launched and in Position on Its Abutments: The Time That Elapsed between Taking This Picture and the One in the Upper Left-Hand Corner Was Eleven and One-Half Minutes. Later the Feat was Performed in Even Less Time. Because of the Manner of Launching, It Was Necessary to Make This Structure 104 Feet Long to Give a Useful Span of 56 Feet. The Extra Bays have Already been Removed

PHOTOS BY COURTESY OF ENGINEERING NEWS-RECORD

ASSEMBLING TABLE HAS REVOLVING TOP

A new article of shop equipment, suited to a large number of uses, is an assembling and welding table, 32 in. high, having a round revolving top, 32 in. in diameter, which turns on ball bearings. Both the top and the pedestal are strongly made, the table being wholly of metal and

Workman Using a New Assembling and Welding Table with Revolving Top: The Foot Lever Locks the Top in the Desired Position

weighing 425 lb. The base measures 16 by 20 in. Vises or clamps can be fastened to the edge of the top, and the latter can be turned to bring the work into the most favorable light. A locking device, operated by a foot lever, holds the top securely in any one of 36 positions. If desired, a second top, 24 in. in diameter, can be used interchangeably with the larger one.

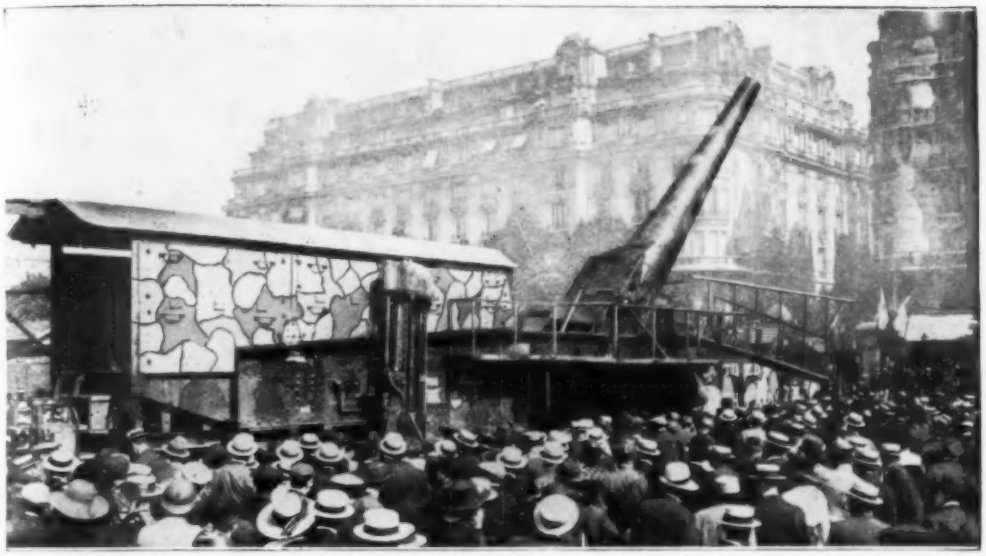
AMERICAN RIDS JERUSALEM OF MOSQUITOES

To an American belongs the honor of having freed Jerusalem from the mosquito pest which has been a source of epidemics in the city for generations. A crusade, which included putting oil on the water in some 1,350 cisterns, was in charge of a sanitarian from Rochester, N. Y., whose work of a similar nature in the Panama Canal Zone won such widespread praise. The extermination of the mosquitoes is but one of many beneficial changes which have been wrought since the British took possession of the Holy City.

RUINS OF CENTURY-OLD FORT IN EASTERNMOST MAINE

The quaint old town of Eastport, Me., which is but a little way from the easternmost point in the United States, is of interest because during the War of 1812 a British fleet sailed into the harbor and took possession of the town and fort without firing a shot. Here British troops remained until the exact boundary between the United States and Canada had been determined. In the accompanying photograph are shown buildings constituting part of the old fort. The structure at the left is the crumbling ruins of the powder magazine. With the exception of the interval indicated above, American troops occupied the fort from 1808 until 1875. In the latter year, it was abandoned and later the property was sold to private individuals, who turned the buildings into dwellings.

Buildings Forming Part of the Fort at Eastport, Maine, with Remains of the Old Powder Magazine at the Left: With the Exception of a Period during and Following the War of 1812, American Troops Occupied the Fort from 1808 until 1875



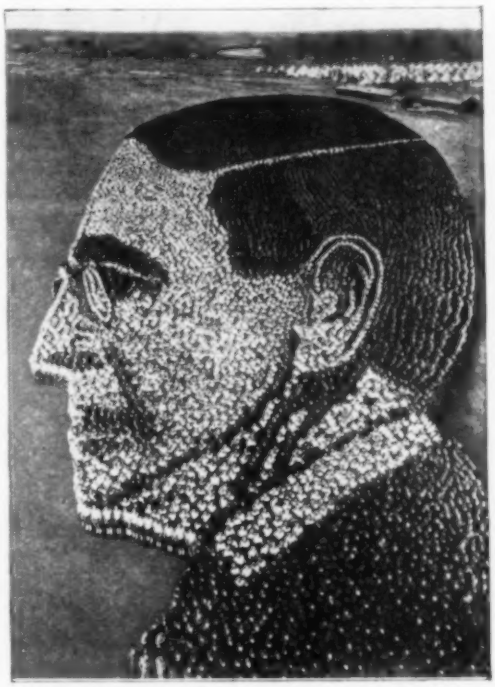
COPYRIGHT, M. ROL.
An Unusual Trophy of the War: A Big German Gun on a Camouflaged Railway Carriage, Exhibited in Champ de Mars, Paris

BIG GERMAN GUN EXHIBITED IN SQUARE AT PARIS

One of the latest and most interesting of the war relics to find its way to Paris is a powerful 11.2-in. German gun mounted on a large railway carriage. The piece, elaborately camouflaged, was captured by Australian troops and inspected at the front by Premier Clemenceau and Marshal Foch before it was removed to the capital and placed on exhibition in Champ de Mars. The capture of big guns of this type was not common during the war, and the prize therefore has received especial notice. In this connection it is interesting to know that a second gun of the same pattern was taken from the Hun a short time after the first one fell to the allies, which was not long before the conclusion of fighting.

THOUSANDS OF SOLDIERS MAKE LIVING PICTURE OF WILSON

Of the many "living" pictures for which great masses of soldiers have posed, none has required greater skill in arranging the men than the one taken at Camp Sherman, Chillicothe, Ohio, representing the profile of President Wilson. Considering the difficulties of using human figures to produce all the lines and shading in a likeness of a face, the result obtained is truly remarkable. The lighter portions of the picture were made by soldiers who wore no coats or hats, while in the darker sections the men were in full uniform. Nearly 50 men were required to represent one lens of the president's eyeglasses. There were 21,000 men in the picture.



COPYRIGHT, MOLE AND THOMAS
One of the Most Difficult to Pose of the Many "Living" Pictures in Which Our Soldiers have Appeared: This Likeness of the President Was Made Up of 21,000 Men, at Camp Sherman, Chillicothe, Ohio

FISHING IN THE U-BOATS' WAKE

How the Sea Gulls Betrayed Hundreds of German U-Boats to the Advantage of Allies and Fishermen

By LLOYD SEAMAN

IN the wealth of strange secrets that the sea is giving up now when the finger is off the lips of sailing men, none is more strange and grewsome than the "Sea-Gull Mystery," another "Ancient Mariner and the Albatross" theme, fit to rival in prose-fact the epic poem of Coleridge.

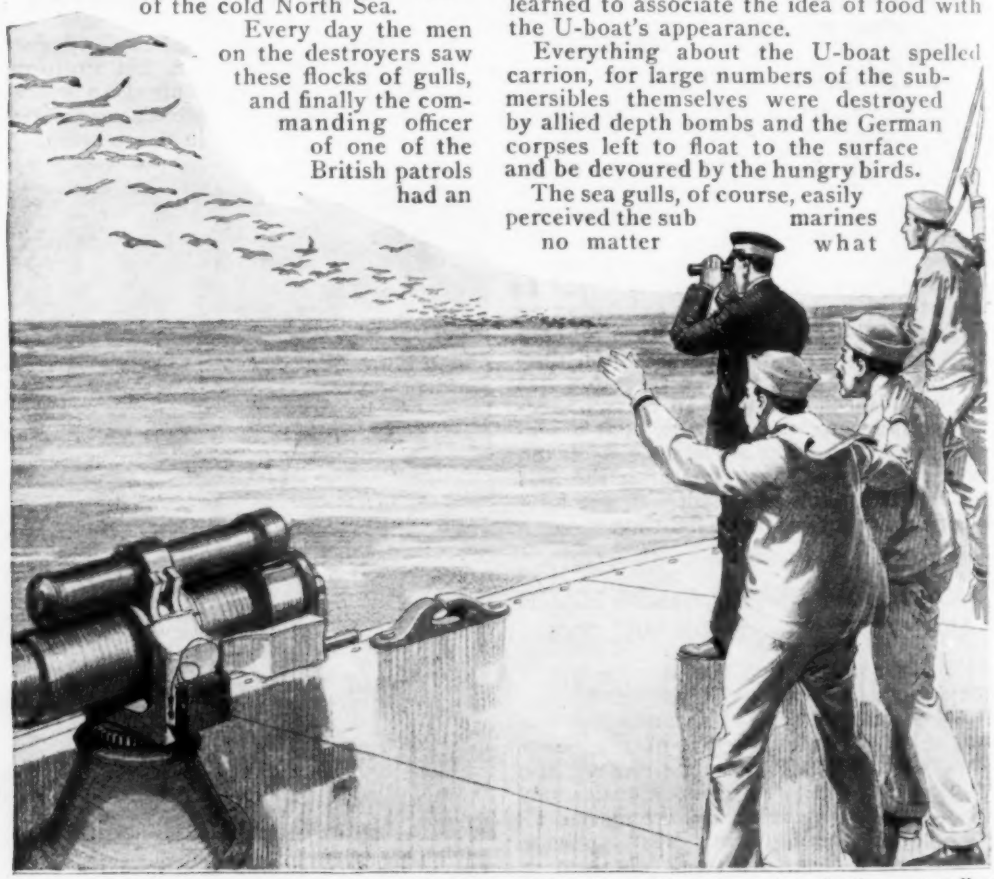
British and American sailors, engaged in antisubmarine warfare, were puzzled for months by the strange actions of great flocks of white sea gulls coursing in definite and queer paths over the water a few feet above the surface. Old salts knew that sea gulls invariably follow sharks, hoping to pick from their murderous attacks pieces of carrion, slivers of mangled fish, and neglected bits of the sharks' victims. But all sailors knew that no sharks came so far north as the English Channel, the Irish Sea, not to speak of the cold North Sea.

Every day the men on the destroyers saw these flocks of gulls, and finally the commanding officer of one of the British patrols had an inspiration. He steamed close to the head of the flock, cut across its path and loosed a half dozen depth bombs, timed to explode at different depths. There was a wild frothing of the waves, and a few minutes later oil, bubbles, and finally wreckage and corpses from a U-boat came to the surface.

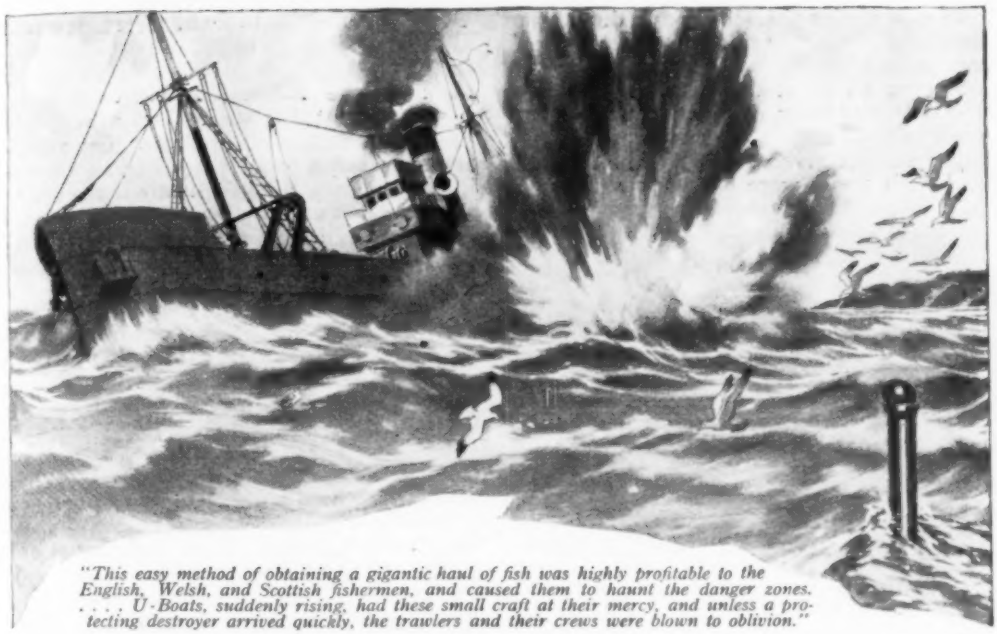
The secret was out. The sea gulls, after two years of experience, had learned that the long, dark shadow in the green depths meant food, that they had only to follow it, and sooner or later human bodies would fall to their carrion appetites. So frequent were the sinkings of steamers, the loss of lives, and the scattering of the ships' larders over the waves, that it is not at all wonderful that birds of the peculiar shrewdness that characterize all carrion species should have learned to associate the idea of food with the U-boat's appearance.

Everything about the U-boat spelled carrion, for large numbers of the submersibles themselves were destroyed by allied depth bombs and the German corpses left to float to the surface and be devoured by the hungry birds.

The sea gulls, of course, easily perceived the submarines no matter what



"Every day the men on the destroyers saw these trailing flocks of screaming gulls, and finally the commanding officer of one of the British patrols had an inspiration."



"This easy method of obtaining a gigantic haul of fish was highly profitable to the English, Welsh, and Scottish fishermen, and caused them to haunt the danger zones. . . . . U-Boats, suddenly rising, had these small craft at their mercy, and unless a protecting destroyer arrived quickly, the trawlers and their crews were blown to oblivion."

their depth, exactly as British and American naval airmen could detect them by virtue of the special clearness which the water assumes when seen from an elevation directly above the submerged object.

The depth bombs, which the seaplane fighters and the allied destroyers dropped, served to furnish the gulls with a still larger source of food, namely stunned fish. Whenever a seaplane saw a long, dark shadow, fathoms down, it wirelessed the "greyhounds of the sea," and within a few minutes the long, lean destroyers were on the job, raining depth bombs, or "ash cans," as the sailors call them, around the suspected area. These highly charged bombs were timed to explode at different depths, and scores of them were sent down in an effort to get the U-boat at all costs. The terrific explosions tore up the water furiously and brought tons of stunned fish to the surface, where they floated, belly up, at times making the top of the water, for a space a half mile in radius, snow-white and shimmering.

Close View of a Depth Bomb, or "Ash Can," as the Sailors Call It. These Proved to Be the U-Boats' Most Effective Foe

Upon such a feast the sea gulls fell with wild shrieks, as they had, in the majority of instances, seen the U-boat and been following its course.

In waters close to the British Isles, however, the fishermen, venturing out in steam trawlers, gave the birds battle for the fish. This easy method of obtaining a gigantic haul of fish was highly profitable to the English, Welsh, and Scottish fishermen, and caused them to haunt the danger zones, where they could, after a depth-bomb attack, get all the herring, mackerel, haddock, and cod their boats would hold, in one-tenth the time taken for trawling a like number, and incidentally, at only a fraction of the cost of using nets. Giant dippers were made by these adventurous fishermen; and the stunned fish lifted in as rapidly as the men could dip.

The British records show an extremely high rate of sinkings among the trawlers,

and this is, for the most part, due to the fact that the fishermen haunted the danger zones, following the destroyers in order to be in at the death of the fish. U-boats, suddenly rising, had these small craft at their mercy, and unless a protecting destroyer arrived quickly, the trawlers and their crews were blown to oblivion.

The fact that the depth bombs exploded at various distances under the surface made the trawlers' booty much larger, since surface explosions only stunned herring and mackerel, fish that swim near the top, while deeper concussions brought cod and haddock and flat fish to the surface.

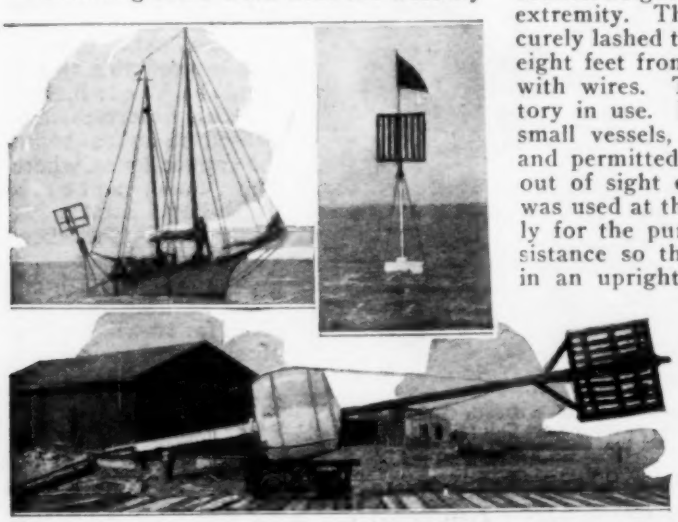
Sailors from destroyers tell of seeing gulls ravenously descending upon the boats of the fishermen, screaming and "cursing" the men who were robbing them of their rightful prey—sea carrion. At times a trawler's crew would be forced to beat off the cloud of gulls that, emboldened by hunger, flew within a few feet of the deck.

All through the last two years of the sea war, the allied forces have made highly profitable use of the gulls, setting "lookouts" to make a special study of their flights since the birds' betrayal of the "devilfish" became increasingly frequent. There was no way that the Germans could avoid the birds. The "foul" droves clung to them, like the dead albatross about the neck of the helpless Ancient Mariner, a punishment for their sins, a sentence passed upon them for murder. The superstitious fishing folk of the British shores, it is interesting to note, firmly believe that there was some supernatural connection between the carrion birds and the murderous submarines, and no amount of scientific explanation as to the ability of the birds to see into the depths will make the really simple phenomenon seem to them a natural thing.

In connection with this picturesque thing, comes the news that the fishing companies of Great Britain are preparing a bill for presentation in parliament to legalize the dynamiting of fish on the high seas, and which would employ all of the thousands of depth bombs, now useless, for this purpose. These ash cans kill or stun all fish within 200 feet, and would, the trawling firms say, bring down the cost of fish in the Isles materially, increase their number in the markets, and devote war material to a useful purpose. The number of fish in the sea is too great to be seriously lessened by this wholesale slaughter, they insist.

GEODETIC SURVEY IMPROVISES NOVEL OBSERVATION BUOY

During the summer of last year the United States Coast and Geodetic Survey, in executing some work near the westerly Florida reefs, had occasion to improvise and employ a novel type of target buoy to facilitate triangulation in open waters. A four-vaned latticed target was placed at the top of a stout 25-ft. pole and a counterweight made fast at the opposite extremity. Three sealed barrels were securely lashed to the mast, at a point about eight feet from its lower end, and braced with wires. The signal proved satisfactory in use. It was easily handled from small vessels, was visible at long range, and permitted accurate work to be done out of sight of land. The lattice target was used at the top of the mast apparently for the purpose of lessening wind resistance so that the signal would reflect in an upright position.



Floating Triangulation Target Used by Geodetic Survey: Extreme Left, being Launched from Schooner; Middle, in Service; Below, Showing Details of Construction

¶According to a new ruling, officers and men of the army who were not fortunate enough to get to France or other fighting fronts are entitled to wear a service chevron of silver, similar to the gold one authorized for oversea service.

NEW NAVAL DIRIGIBLE IN LONG FLIGHT

A few weeks ago one of the United States Navy's new twin-engine dirigible balloons made a journey of 315 miles without mishap, in 13 hr. 13 min. of flying, thereby indicating the splendid advancement which has been made by our sea forces in this important line of activity.

The dirigible is known as the "D-17," and traveled from Akron, Ohio, where it was built, to the naval air station at Rockaway, N. Y., with a crew of six men. The flight was begun at 1:10 a. m. and concluded the same evening at 6:30, a stop of a few hours being made at Washington, D. C. The passage of the big craft through the air attracted more than usual interest.

CENTURY-OLD MAINE BRIDGE STILL IN USE

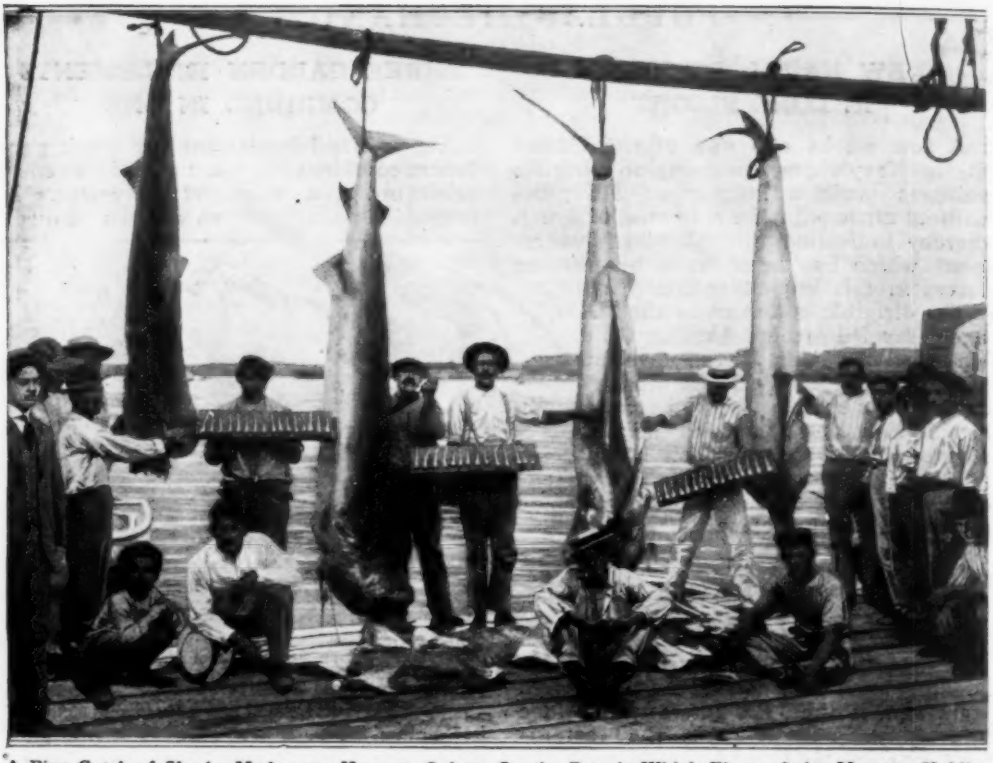
A structure, well illustrating bridge building as it was carried on a hundred years ago, is the 1,800-ft. wooden bridge connecting Eastport, Me., the easternmost city in the United States, with the mainland. Though more than a century old, the bridge is still in service, and, until about two years ago, a toll was exacted of its users, it being one of the last Maine bridges to be opened to the free use of all. Because the tide at this point rises 22 ft. or more, the floor is supported on high piers and piles. In recent years the cost of repairing the old structure has been heavy. Last winter, when the cold was unusually severe, ice tore away a 75-ft. section, and the principal highway to Eastport was closed for a period of several days.

THREE GARDEN IMPLEMENTS COMBINED IN ONE

A new hand implement for truck gardeners combines the functions of a weeder, cultivator, and a soil pulverizer. It resembles a narrow lawn mower in general appearance, though it operates differently. Extending from one rim to the other of its two solid wheels is a series of blades that break up the soil as they revolve, while immediately back of the wheels is a horizontal blade, which cuts off the roots just below the surface. By swinging the handle on its pivots so that it is in a position for pushing the wheels in the opposite direction, a set of tines is brought into position for deeper cultivating. On either side, projecting forward, is a wire guard which slides along the ground, pushing the leaves of the plants back, or lifting them up, so that they are unharmed by the implement.

Combination Garden Weeder, Cultivator, and Pulverizer: Upper Left-Hand View Shows Leaf Guards in Position; Center View Shows Tines Upraised, with Horizontal Blade in Position, While Below Tines Are Ready for Cultivating

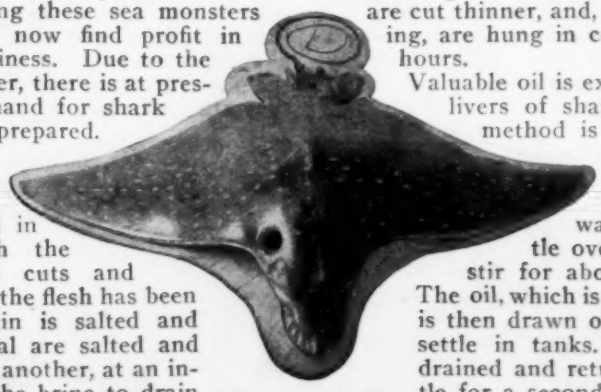
Bridge More Than a Century Old, Connecting Eastport, Maine, with the Mainland: This Picture was Taken Shortly after an Accumulation of Ice had Torn Away a Section Adjoining the Covered Portion



A Fine Catch of Sharks Made near Havana, Cuba: On the Boards Which Three of the Men are Holding are Displayed the Young Found in the Big Fishes. The Cubans are Learning That Valuable Hides, Steaks, and Oil can be Obtained from These Sea Monsters

SHARK FISHERS ENJOY INCREASED PROFITS

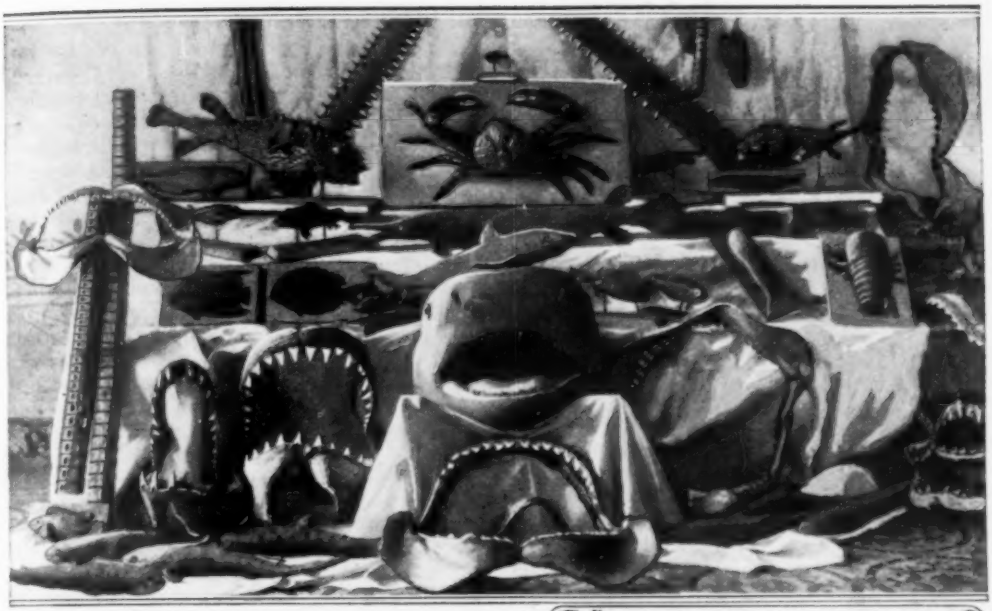
The new values which the war has given to various products obtained from sharks, have produced unusual activity among shark fishers, while many who once engaged in catching these sea monsters only for sport, now find profit in making it a business. Due to the scarcity of leather, there is at present a large demand for shark hides, properly prepared. The whole skin, minus that on the head and tail, is removed in one piece with the fewest possible cuts and holes. After all the flesh has been cut off, the skin is salted and rolled, or several are salted and laid flat, one on another, at an incline, to allow the brine to drain off. After proper curing, they are packed in boxes or barrels for shipment.



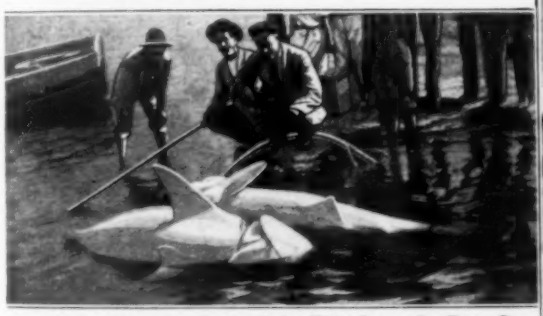
One of a Family Related to Sharks and Variously Called Devilfish, Sea Devil, and Eagle Rays

There is a good market also for smoked shark meat, the raw meat being first cut in suitable strips. For hot smoking, after treatment in brine, the pieces are put in a sling and hung for four hours above a low fire, and then for about two hours in the smoke of a smothered fire, for coloring. For cold smoking, the strips are cut thinner, and, after proper curing, are hung in cold smoke for 48 hours.

Valuable oil is extracted from the livers of sharks. A common method is to chop the organs into small pieces, place them in a water-jacketed kettle over a low fire, and stir for about half an hour. The oil, which is of the best grade, is then drawn off and allowed to settle in tanks. The residue is drained and returned to the kettle for a second rendering, while the refuse obtained from this process is dried and sold as fertilizer. For some time material of this sort has been widely used in many European countries and is now beginning to find a growing market in the United States.



A Rather Terrifying Collection of Specimens from Tropical Waters, Including a Shark's Head, Several Varieties of Sharks' Jaws, and Swords from Swordfish



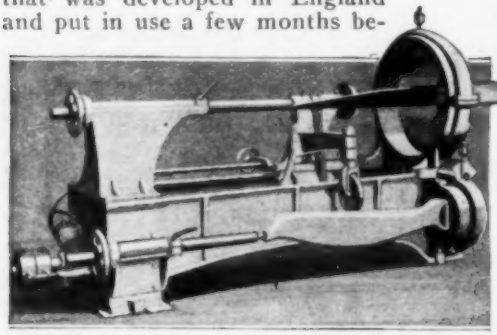
"Bringing Home the Bacon," in This Case, Is Two Carcasses of Ocean Monsters from Which Valuable Hides and Other Products can be Obtained

From Sharks Like These Oil for Adulterating Cod-Liver Oil and for Other Purposes is Sometimes Obtained

A Partly Dressed Shark Carcass from Which the Viscera have been Withdrawn: Portions of the Latter, Including the Liver, are Chopped into Small Pieces and an Oil of Good Quality is Obtained by Proper Heating

PROPELLER-CUTTING MACHINE IS LIKE COPYING LATHE

Excellent work is said to be accomplished by a propeller-shaping machine that was developed in England and put in use a few months before the end of the war. Essentially the apparatus is a modified copying lathe.



BY COURTESY OF ENGINEERING, LONDON

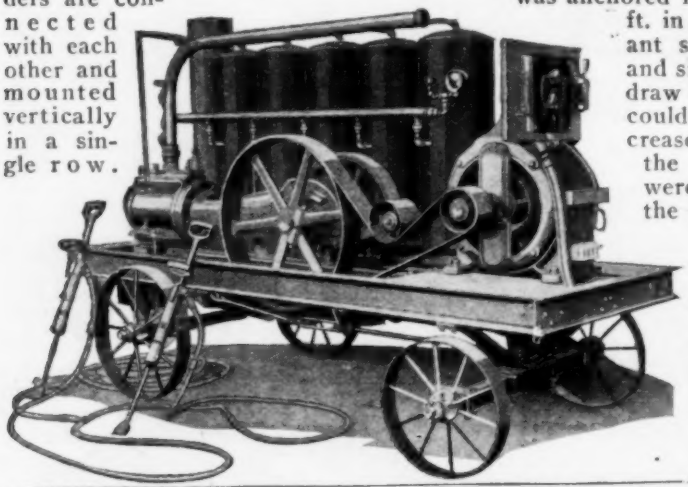
The Movement of the Cutter Block is Guided by the Roller, Visible at the Side, Which Travels on the Model

Propellers turned out by it are so well finished that they need only to be touched up with sandpaper, it is claimed. The centers that hold the blank and the model are geared so as to rotate at like speeds. A wheel-shaped roller travels on the model, following its lines, while a cutter block of corresponding size operates on the blank, shaping it. The two members are mounted on a swinging angle bracket. The driving headstock consists of a large bearing within which there is a rotating flanged disk with an aperture through which one-half of the propeller projects. When one blade has been shaped, the blank is removed and its position reversed.

¶An unexpected and rather amusing result of the use of gas at the front is the fact that coins carried by those in gassed regions were turned black by the fumes, and later many shopkeepers in the smaller French villages steadfastly refused to accept them.

USE STREET CARS' AIR TANKS IN BUILDING COMPRESSOR

In one of the western cities a surface-traction company is using a portable air compressor that is of rather novel construction. Instead of having one large tank, it has a series of five small ones, salvaged from old street cars. The cylinders are connected with each other and mounted vertically in a single row.



This Mobile Compressor, with Tanks Salvaged from Old Street Cars, Supplies Air for Pneumatic Tools Used by Repair and Construction Gangs

A large motor, mounted at one end of the all-steel truck that carries the equipment, drives the compressor.

BALLOONIST HAS THRILLING RACE TOWARD THE SEA

Caught in the teeth of a violent gale, a lieutenant in an army balloon school in California not long ago had the thrilling experience of being hurried over the mountains toward the Pacific at altitudes ranging as high as 10,000 ft. The balloon was anchored for observation work 2,500 ft. in the air when the lieutenant saw a storm approaching, and signaled the ground crew to draw the bag down. Before this could be done, the wind had increased alarmingly, and when the basket and its occupant were within about 100 feet of the ground, the cable snapped. Instantly the balloon shot upward, and was soon 9,000 or 10,000 ft. high, and at the same time was racing toward the sea. A few moments later, too much gas having escaped, the bag dropped 4,000 ft. in about two minutes. Still in danger of drifting to sea, the balloonist leaped overboard with his parachute, dropping, unharmed, into a tomato patch, while the balloon, in which he had ripped a gash, landed at the opposite end of the field.

REVIVAL OF BROOM MAKING IN THE SOUTH

In many parts of the South where crop rotation is being tried, the raising of broom corn is being introduced. It has been found that in Florida, Alabama, Mississippi, Louisiana, and Tennessee both the soil and climate are suited to it. The attention of planters is being called to the fact that no great skill is required to work up the raw material into brooms—a task to which boys and girls as well as adults can devote their leisure hours. It is claimed that a broom-corn crop handled in this way is more profitable to the grower than cotton, even at the present high prices which the latter commodity now commands.

PHOTOGRAPHER IS AIDED BY PHONOGRAPH

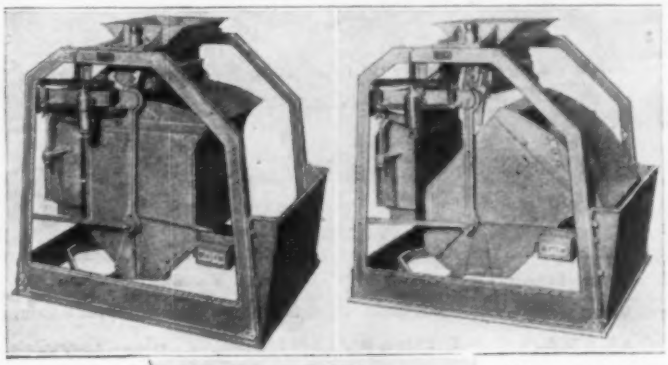
A photographer has found a phonograph a valuable aid in obtaining the desired facial expression in a subject. After studying the face of the person whose likeness he is to obtain he decides whether he wishes an animated, reserved, sad, or pensive expression. He then places a record in the phonograph likely to stimulate the expression desired. For animation he will play such a tune as "Dixie," while to produce a sad or thoughtful expression "My Old Kentucky Home" may be played.

AUSTRALIA SEEKS AMERICAN AFTER-WAR TRADE

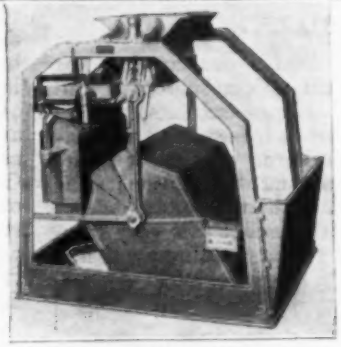
Australia has recently sent a commercial envoy to the United States thereby establishing a new precedent, the custom in the past having been for the mother country to look after international interests of the British empire. But the commonwealth on the far side of the world has large stores of wool, wheat, meat, etc., for much of which new customers must be found. In the past Germany has been a large purchaser of these materials but Australians are averse to patronage from that country hereafter. The new representative has made his headquarters in New York.

SCALE WEIGHS AND DUMPS GRAIN AUTOMATICALLY

With a view to providing millers, grain dealers, etc., with means for automatically and rapidly weighing grain as it is being loaded from one container to another, an automatic scale has been devised which has a number of interesting features. The grain flows from the chute into the metal bucket, which is hung from a scale beam mounted in a suitable metal frame. The bucket is balanced with a weight equivalent to the number of bushels of grain which the former will hold, and when it is full, it is tripped automatically, swings over, and discharges into the bin below. At this point the flow of grain is shut off. A movable weight, on an auxiliary scale beam, is provided, by which allowance is made for grain that reaches the bucket after the chute has been closed. On emptying itself, the bucket returns to an upright position and the operation is repeated.



Above, at Left, the Bucket is Ready to be Filled. At the Right, It has Just been Tipped and is Swinging into Position for Emptying



Grain Scale Which Weighs and Dumps Automatically: Here the Bucket has Just Discharged Its Contents

¶Two years of prospecting by a geologist and explorer has established rather definitely the location of extensive lands, tributary to the new Alaska railroad, from which it is expected that platinum can be mined profitably.

Irrigation Flume over the Big Horn River, Wyoming: When the Stream Undermined the Original Aqueduct, Engineers Hurriedly Replaced It with a Four-Foot Iron Pipe, but This Fell into the River Just as It was being Completed. The Work Then had to be Done All Over Again, a Wooden Flume being Substituted

CARABAO THE DRAFT ANIMAL OF FILIPINOS

In the United States the carabao, or water buffalo, is an object seldom found outside zoos and circus exhibits, but in the Philippine Islands it is nearly as common as horses are here. In fact, it is the draft animal of the natives. But it differs from horses, and even oxen, which it slightly resembles, in that it is very fond of the water and is most unhappy if not

Stream in the Philippines Showing Three Water Buffalo Enjoying Their Daily Swim

allowed to spend some time each day in a pool or stream.

IRRIGATED TRACT THREATENED BY TWOFOLD MISFORTUNE

One misfortune following on the heels of another threatened the destruction of crops on 12,000 acres of Wyoming land last summer, and twice destroyed a vital part of a large irrigation system. The first mishap occurred when the swollen Big Horn River undermined one of the piers carrying a 250-ft. irrigation pipe over the stream. To save the fields from drought, engineers hastily assembled cables, 4-ft. iron pipe, etc., and after throwing a structure like a suspension bridge across the channel, laid the pipe on it. In a month, the work was practically finished, and then the second misfortune came. One of the supporting towers toppled over, hurling the whole aqueduct into the stream. Then a 48-in. wood-stave flume was built and suspended from the cables, and soon water was flowing onto the fields.

HOW BRITISH STRATEGY KEPT SUEZ CANAL OPEN

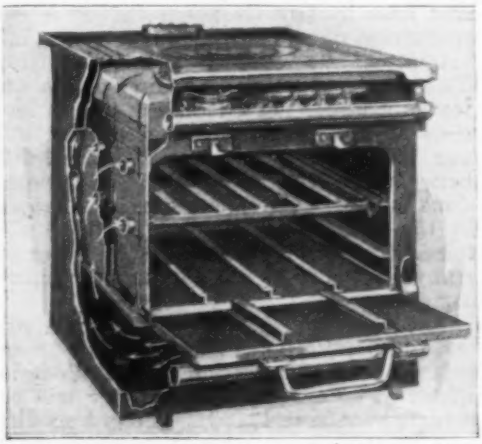
That there are some things in the science of strategy not taught in the war colleges, is illustrated by Great Britain's defense of the Suez Canal, the facts of which have recently been made public. When the allies in Flanders were hard pressed, it was necessary to summon the two strong divisions stationed at the canal, and their place was taken by three hastily mobilized brigades from India. This small force faced the whole Turkish Syrian army, staffed by Germans, while behind it was the Egyptian population threatening trouble.

In an article in the Philadelphia North American, Maj. Gen. Sir George Younghusband tells how small redoubts were built every two or three miles on the east bank, while covering the intervals, on the west bank, were trenches. The British officer in command, though not deeply learned in higher strategy, performed his task with rare skill. The ingenious, if unconventional, means used to detect the approach of enemy scout-

ing parties to the canal, consisted in daily making a broad, smooth mark beside it, in the sand, by drawing a timber along, wrapped in sacking. This mark was kept intact the whole length of the waterway, and repeatedly it enabled the watchful guards to discover tracks made at night by would-be mine layers. All told, 16 mines designed to blow up passing boats, and so block traffic, were found and rendered harmless. By such means the small force kept the waterway open for a whole year, without serious mishap.

TRIPLE-WALL HOTEL RANGE HEATED ECONOMICALLY

A new hotel gas range, it is claimed, requires a relatively small amount of fuel because of its special design, which causes much of the heat from the upper, as well as the lower, burners to pass around the oven before reaching the flue. In addition to an outer casing inclosing the oven, there is an intermediate wall with vents leading from it to the interior of the oven. The burners above the baking chamber, employed to heat the top of the stove, are so placed that air heated by them passes down the sides of the oven, between it and the intermediate wall,



Sectional View of New Hotel Gas Range: Black Arrows Show How Heat from Upper Burners Circulates around the Oven, While the White Arrows Indicate How the Heat from the Lower Burners Enters the Oven

while heated air from the burners below passes upward between the outer and intermediate walls, entering the baking chamber through the vents.

GREAT NIAGARA POWER PROJECT UNDER WAY

Quietly and without formality the Hydro-Electric Power Commission of Ontario has begun work on one of the greatest power projects yet undertaken at Niagara Falls. The work, when completed, will permit a great extension of the commission's low-priced current service. The plant for which a new canal is being dug will produce 300,000 hp., or nearly half, it is said, of the present output of current from both sides of the river, combined. Eventually the new project, which will be completed about

The Beginning of a 12-Mile Canal Extending around Niagara Falls, Which Is Part of a Project to Develop 300,000 Horsepower at a New Plant below the Cataract

Loading Dirt Cars Placed along the Brink of the New Canal: By 1921 Some 11,000,000 Cubic Yards of Earth and 4,000,000 Cubic Yards of Rock will have been Excavated

1921, may be expanded to produce 1,000,000 horsepower.

What is here being undertaken for the first time by any Canadian agency is the utilization of almost the whole of the fall between Lake Ontario and Lake Erie. Two of the existing Canadian plants are working under net effective heads of less than 135 ft., while the proposed plant will use a head of 305 ft. out of a total fall between the lakes of 330 ft. The tremendous advantage of this increase is shown by the fact that about 30 hp. will be obtained from each second-foot of water as compared with 14 hp. obtained by existing plants.

The canal will be 12¾ miles long, four and one-fourth miles of which will be an enlargement of a section of the Welland River. The current of the latter will be reversed. About 15,000,000 cu. yd. of dirt and rock will be excavated. The cliffs are nearly vertical at the power-house site, so that the penstocks will lie at a very steep angle, and will be only 450 ft. long—a fact that reduces the cost of construction. The turbines, the engineers state, will have the greatest capacity of any water turbines yet designed.

SLOPING SCHOOL YARD MADE LEVEL IN NOVEL MANNER

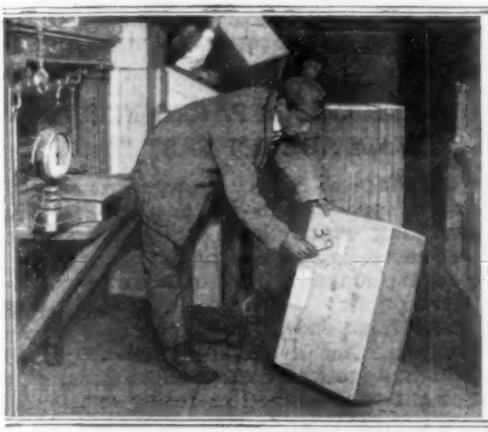
The location of the Fairmont school, in San Francisco, on a steep hillside, made it particularly difficult to provide a satisfactory playground. Formerly the entire slope was boarded over. With the erection of new buildings, however, the ground was terraced and graded at three different levels. Concrete steps now connect the three areas, and between the highest and the adjoining level the retaining wall has been so made that it can be used as bleachers when the lower area serves as an athletic field.

TRAINING DEPARTMENT HELPS FACTORY'S OUTPUT

A concern which has been engaged in an essential war industry has given a demonstration of the value of a well-conducted training department for its employes, its experience proving that such a department increases the output and reduces the annual labor turnover. In many respects, what was done in this plant would serve as a model for other factories. The training section occupies a separate room and is in charge of competent instructors, taken for the most part from the production departments. The hours are the same as in the rest of the plant, the raw material worked on is the same, but the wages are lower, with the understanding that as soon as the pupil is worthy of promotion the wage will be increased. Most of the employes in this plant are women, and they are all required to wear a two-piece uniform. High-heel shoes and silk stockings are condemned, and wearing of jewelry is not permitted. On the average, learners stay with the training department about a week.

A Portion of the Playground of the Fairmont School, in San Francisco: Between the Highest Area, at the Rear, and the One in the Foreground Are Concrete Bleachers. Steps Leading to a Third and Still Lower Level can be Seen at the Extreme Right

EFFICIENT EXPRESS-HANDLING SYSTEM ADOPTED



Giving the Container Its Car Number upon Delivery at the Terminal for Billing

The Box is Placed with Other Similarly Labeled Ones in Compartment Number 39

Confusion is Eliminated and Efficiency Promoted, for Car 39 is Not Visited by a Half Dozen Different Wagons

To facilitate the handling of express matter, a new system of routing has been instituted at terminals in large cities since unified operation was effected by the government. The facilities of cars available on different routes have been tabulated and each carrier given a number. When a package, for instance, is delivered at a terminal for billing, the number of the car in which it is to be placed is marked on it. Subsequently it is taken to a storage compartment bearing the same number. It is then a simple matter for relay wagons or trucks to transfer it, with other matter in the same bin, to the proper car. The method obviates inefficiency by abolishing a condition that formerly resulted in several wagons making trips to the same car. Likewise it lessens the difficulty of breaking in new men who might cause misrouting or loss of shipments.

GERMANS BUILDING BIG PLANE FOR TRANSATLANTIC FLIGHT

While Americans, Britishers, and Italians have been making plans for big aeroplanes of 5,000 and, in one instance, 18,000 hp., with which to cross the Atlantic, the Germans have not been idle. It is reported that even before the signing of the armistice they had begun the construction of a mammoth plane of 3,000 hp. and a wing spread of 198 ft. According to the same authority, an airship is also being built for transatlantic flying, which will be equipped with nine engines driving eight propellers, and will be able to carry 100 passengers. A flight in this machine is contemplated for some time in July.

PATENT FACE MASK PROTECTS WEARER AGAINST DISEASE

Of special interest because of the prevalence of influenza this winter, is a recently patented face mask. The mask proper consists of a wire frame, bent to fit snugly to the face and covered with extremely fine-mesh wire gauze. This protector is held in front of the nose and mouth by being attached to the bows of a pair of spectacles, the lenses of which are extra large in order that the eyes may be well shielded. The device is one that can be put on or removed easily.

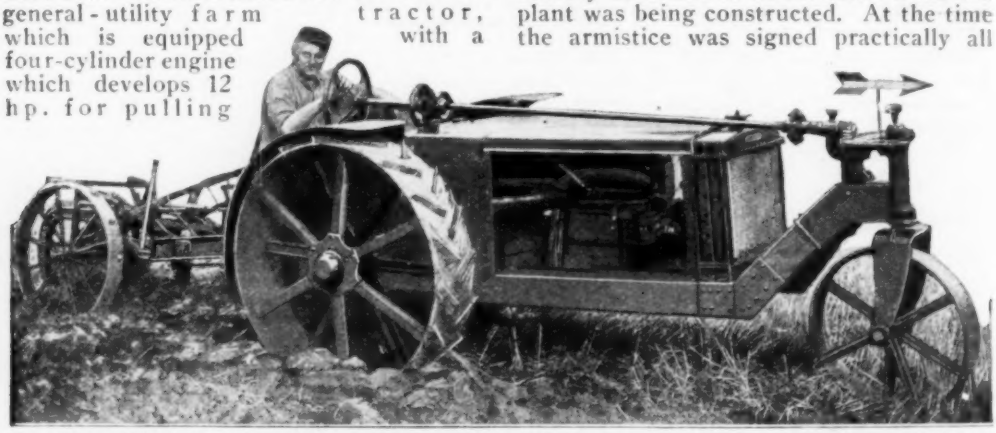
WHEELED OUTFIT HELPS INVALIDS TO WALK

A walking machine for persons recovering from illness, or wounds, is a piece of hospital equipment of English make in use by invalid soldiers and others, enabling them to walk about at a time when they scarcely have strength enough to use crutches.

It is provided with two uprights, fashioned somewhat like crutches, on which the patient rests, at the same time grasping handles at either side. These supports are attached to a U-shaped steel frame mounted on three wheels, similar in size and arrangement to those of a child's velocipede with a small front wheel.

NEW THREE-WHEEL TRACTOR FOR GENERAL FARM USE

In recent severe tests excellent results have been obtained with a new three-wheel general-utility farm tractor, which is equipped with a four-cylinder engine which develops 12 hp. for pulling and 25 hp. for driving a belt. It has a turning radius of 8 ft. and travels at a rate of from one and three-fourths to five miles per hour, depending on whether high or low speed is used. Recently the machine, drawing two 14-in. plows, plowed four and one-half acres of clay soil at the unusual depth of 9 in. in less than six hours, using 11 gal. of fuel. It also furnished power for filling a 60-ton silo, with a fuel consumption of only 10 gallons.



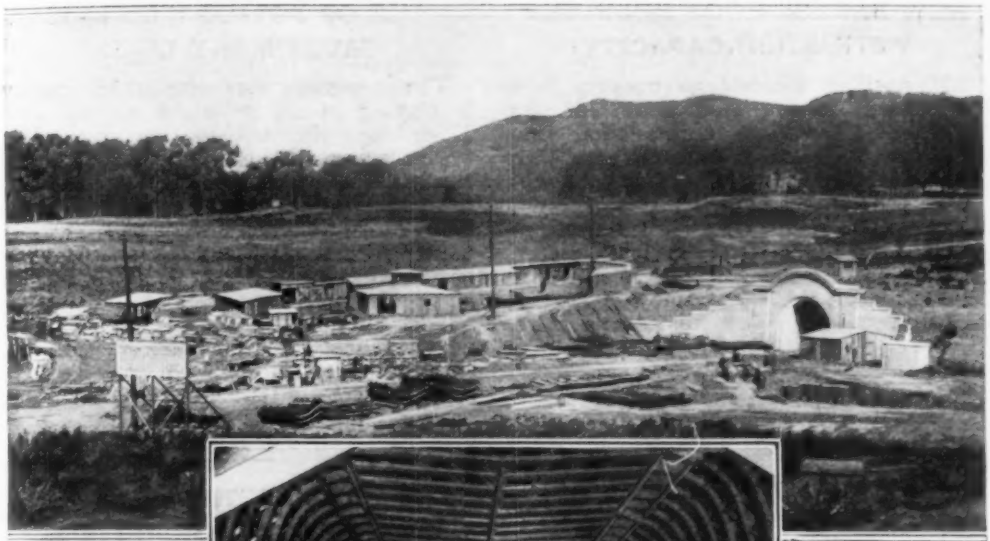
New Three-Wheel Farm Tractor Suited for a Variety of Uses: It is Intended to Handle Two 14-Inch Plows under Any Conditions. It Has a Wheel Base of 86 Inches and Weighs 3,200 Pounds

AMERICA PREPARED FOR GAS WARFARE ON VAST SCALE

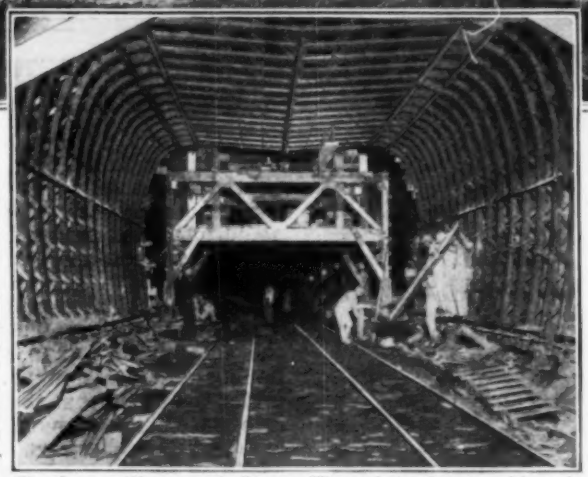
A phase of America's war preparation, more appalling in its possibilities than anything which the fighting nations experienced, is revealed in the story of this country's manufacture of poison gas, now made public. When at last America, with great reluctance, adopted gas as a war weapon, that it might defeat the Huns who had instituted the fiendish practice, it set out to produce the deadly substances on a greater scale than Germany, England, and France combined. The maximum production of the first two countries has been estimated at 30 tons daily, each, and of France at a less amount. But with the $60,000,000 the United States invested in a vast poison gas plant near Baltimore, and $12,000,000 in subsidiary plants, our government was turning out 200 tons a day in the weeks preceding the signing of the armistice.

The human mind cannot grasp the possible destructive power of this output, for one drop of the gas, properly placed, is sufficient to kill a person. Much of the machinery used had to be invented while the plant was being constructed. At the time the armistice was signed practically all equipment was built and tested for carrying one-ton consignments of the most deadly gas by aeroplane over such cities as Metz and dropping it on the fortifications. One such charge, it is said, would have been sufficient to kill every living thing in an acre tract.

PORTABLE STAGING TRANSFERS STEEL TUNNEL FORMS



Back of the Sign Visible at the Left
of the Top Picture, are Shown Disassem-
bled Sections of One of the Forms



The Lower Photograph Gives a View of the Staging After the Forms have been Raised and Bolted in Place, for the Concrete to be Poured

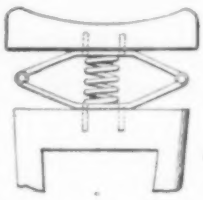
Quite an ingenious method is being applied to save labor in moving the heavy steel forms, used in reinforced-concrete tunnel construction, from one position to another. After the concrete, forced behind the steel supporting structure by compressed air, has set, a large, heavy timber staging, mounted on wheels, is moved into position. The forms, instead of being entirely disassembled, are merely unbolted along the center line at the top. The two halves, each of which is hinged at the "bilge," are collapsed so that their weight is borne by the staging. The latter is moved forward to the next section to be concreted. The forms are raised and bolted. All is then ready for pouring the concrete.

PRESSURES INCREASED BY ELECTROLYSIS

By utilizing the well-known ability of electricity to cause water to decompose, engineers have been able to obtain hydraulic pressures that are remarkable. One ampere of current in one hour will decompose sufficient water to produce something like a pint of hydrogen and half a pint of oxygen. That the presence of these gases, confined, would produce greatly increased pressures, is not difficult to imagine. One man claims to have produced pressures as high as 1,860 atmospheres by this process which possesses many interesting engineering possibilities.

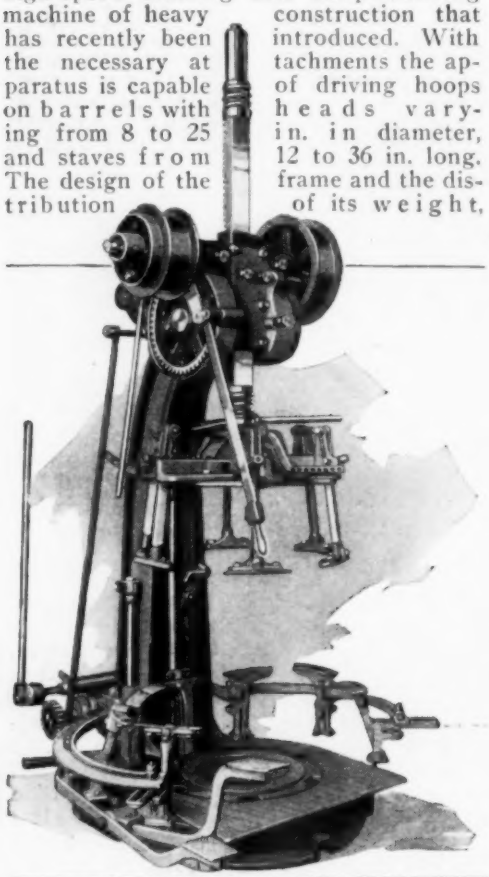
RESILIENT CRUTCH ADDS TO USER'S COMFORT

A simple improvement in a crutch, designed to give added comfort to the user, consists of two springs placed immediately below the curved portion on which the armpit rests. This gives the crutch a resiliency not possessed by others, and also tends to lengthen the stride of the user without additional effort on his part.



NEW BARREL-HOOP REDRIVER WITH GOOD CAPACITY

Of possible interest to coopers is a high-speed trussing and hoop-redriving machine of heavy construction that has recently been introduced. With the necessary attachments the apparatus is capable of driving hoops on barrels with heads varying from 8 to 25 in. in diameter, and staves from 12 to 36 in. long. The design of the frame and the distribution of its weight,



The Broad Base of the Machine Provides Ample Support without the Usual Foundation

which amounts to 4,600 lb., are such as to resist strains and practically eliminate vibrations. The bottom-bilge hoop-drivers are carried on curved arms that open automatically to receive a barrel. The members are closed by a foot lever, which releases the supporting ring and causes the barrel to be raised so that the drivers engage properly. When used for trussing, a special set of cones is needed for each size of barrel. The double-end machine has a capacity of from 1,500 to 2,000 barrels.

¶ A reminder of the great part which Russia played in the war despite final misfortune, is found in the statement that its casualties totaled 8,000,000 men, of whom 3,000,000 were killed.

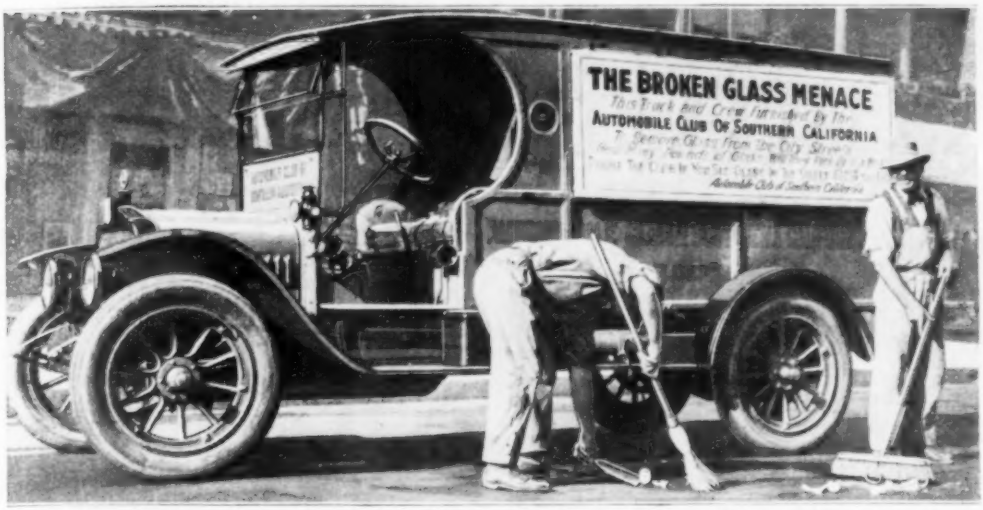
USE OF POLICE WIRELESS SAVES MANY LIVES

The important part wireless telegraphy is playing in the activities of the New York City police is shown in a recent report covering the past two years. As a result of messages sent from the roof of the police headquarters to the police patrol, 25 lives were saved and $400,000 worth of merchandise was rescued, when river craft, on account of accident, drifted helplessly in the lower bay and in Long Island Sound. The police-radio outfit, which handled 2,000 messages in the period indicated, is able to receive dispatches from a distance of 1,500 miles and has a sending radius of 300 miles.

WAX FOR ELECTRIC FIXTURES MELTED WITH SOLDER IRON

For covering countersunk screws with sealing wax and filling other depressions in the bases of small wiring devices, a manufacturer uses a number of electric soldering irons mounted at an incline on brackets. Leading down to the tip of each iron is a groove into which the worker places the end of a stick of sealing wax, holding it just long enough to melt the amount of wax needed. The article having a depression to be filled is held under the tip so that the melted wax drips into place. The irons used are of the type having removable tips. A metal hood is provided to carry off the fumes from the melted wax.

Electric Soldering Iron with Grooved Tip, Melting Sealing Wax, Which is Used to Fill Depressions in Electric Fixtures. The Metal Hood is Provided to Carry Off the Fumes



In One Week, 186 Pounds of Broken Glass were Removed from Los Angeles Thoroughfares. The Picture Shows How It was Done

MOTOR-CAR CLUB CAMPAIGNS AGAINST BROKEN GLASS

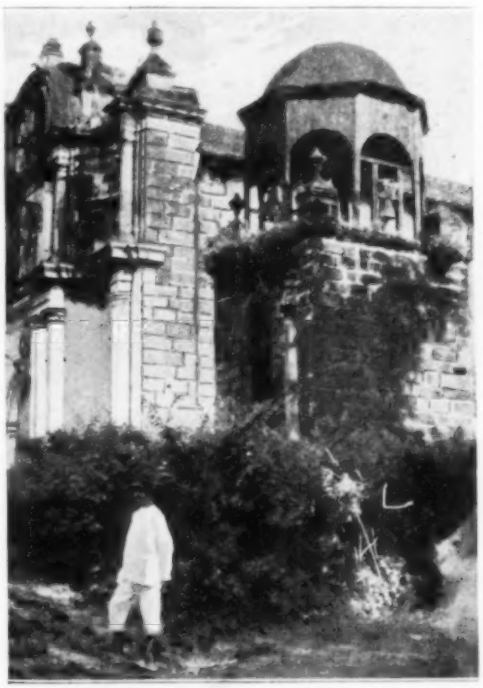
One hundred and eighty-six pounds of broken glass were removed from the streets of Los Angeles in one week by a two-man crew assigned to a truck owned by the Automobile Club of Southern California. The machine, conspicuously placarded, was sent out largely for the purpose of calling public attention to a condition that menaces motorists the world over. It traveled 815 miles in collecting its by no means small cargo. Although this activity was merely a temporary one, the club makes a practice of removing glass, day or night, from the city streets in response to reports made by telephone.

FLIGHT TO EAST AFRICA STARTED BY ZEPPELIN

Information regarding a remarkable flight of a German Zeppelin has recently been reported by a British correspondent, who learned the facts since the coming of peace. A German airship, it is said, left Bulgaria carrying a crew of 22 men, tons of munitions, and medical supplies, bound for German East Africa, which is approximately 3,000 miles from Bulgaria. According to the account, while the ship was flying over Khartum, it received a wireless message ordering it to return, the Germans having learned that the majority of their troops in their African territory had surrendered.

PHILIPPINE CHURCH HAS SEPARATE BELFRY

In the Philippines a belfry is usually built separate from the church, as shown in the accompanying photograph. Earth-

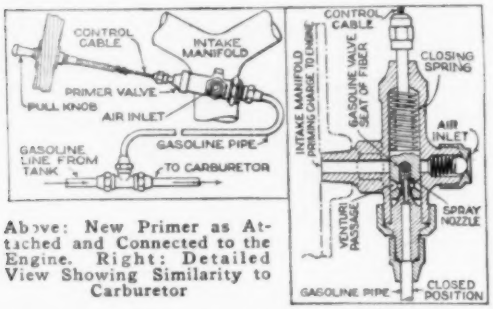


A Picturesque Church near Manila, Philippine Islands, with a Separate Structure for a Belfry: This Arrangement Is Not Uncommon as a Safeguard against Accidents Due to Earthquakes

quakes are not infrequent in the islands, and this precaution is taken in order that a tremor may not send the bell crashing down through the roof.

AUTOMOBILE-ENGINE PRIMER MADE LIKE CARBURETOR

Among the several primers introduced for the use of motorists who experience difficulty in starting cold engines with



Above: New Primer as Attached and Connected to the Engine. Right: Detailed View Showing Similarity to Carburetor

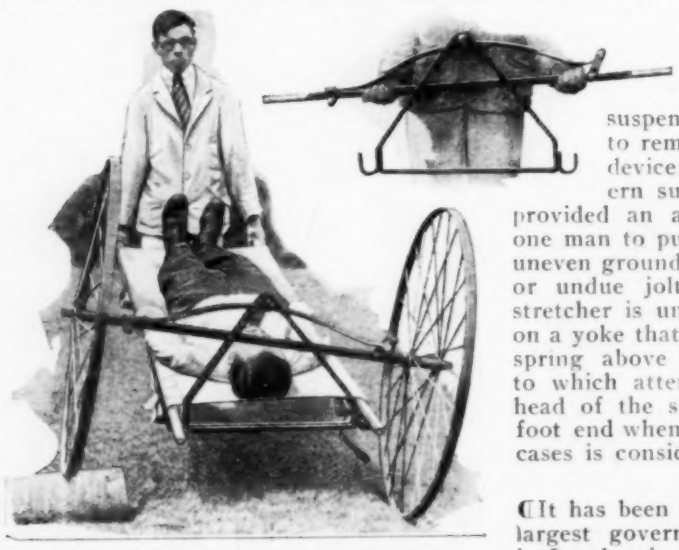
low-grade fuel, there is one that is constructed on the carburetor principle. It is attached to the intake pipe, connected with the gasoline line back of the carburetor, and operates only when the motor is being "turned over," thereby obviating, it is asserted, the common danger of condensation. Gasoline enters the air passage at the choke point and is drawn into the engine at high velocity, aerated and atomized. The priming charge flows steadily in sufficient volume to turn the engine without gas being drawn through the carburetor. Among the broad claims of merit made for the device is the contention that a stone-cold motor can ordinarily be started in two or three turns.

FIGURES TELL BRITISH LOSS ON THE SEAS

In a few figures which were recently given out by the British Admiralty are summarized the sea tragedies which have saddened tens of thousands of British homes—tragedies which are eloquent of this ally's fortitude and service on the sea. During the war 2,475 British ships were sunk with their crews, and 3,147 ships were sunk with their crews set adrift. A total of 670 fishing vessels were lost also, and the merchant-marine service suffered over 15,000 casualties.

¶On invitation from the French Society of Civil Engineers, eight American engineers have gone to France to share in studying reconstruction problems in that country.

SPRING SUSPENSION FOR ONE-MAN STRETCHER



The Stretcher Remains Level When the Wheels Pass over Obstructions, as is Shown Here. Above, at the Right, the Spring Suspension is Illustrated Alone

One of the outstanding features of a new two-wheeled running gear for a standard military stretcher is its spring suspension which enables the bed to remain level at all times. The device is the invention of an eastern surgeon who apparently has provided an apparatus that will permit one man to push or pull a stretcher over uneven ground without material difficulty or undue jolting of the patient. The stretcher is underslung, being suspended on a yoke that is pivoted to a semielliptic spring above the axle. Another point to which attention is called is that the head of the stretcher is lower than the foot end when not in use, which in most cases is considered advantageous.

¶It has been announced that one of the largest government-operated restaurants in London is making a profit of $500 per week and that soon several others are to be opened in various parts of England.

CHATEAU-THIERRY

How Marines Triumphed With Hun Eyes As Long-Range Targets

By E. T. BRONSDON

IT was the *Friedensturm*, the last and greatest of German offensives. Orders and proclamations captured on the persons of prisoners told frankly that the German high command was throwing every resource into the attack. From a *Junker* point of view the wedge was going through to Paris and Orleans. Foch's defensive legions were to be destroyed. The British were to be flanked and driven into the sea. The Americans were to be chased from their sectors, captured or forced to flee from their port of entry, St. Nazaire. Later, when a dismayed Britain had withdrawn and France had been cut to pieces, the interlopers from overseas could be dealt with at leisure.

The storm broke at midnight on July 14, 1918. "Never since the second attack on Verdun has such artillery concentration been seen," stated the communiqué of General Meurthier next day. During two months of that former desperate defense he had commanded the thin line of France's Third Army; he commanded on the Somme in the Champagne sector, adjoining the American forces, on that memorable summer day.

With a number of rifles and mortars, that would have locked wheels had they been placed in a double line on the Somme, the boches placed a box-barrage fire about the allied trenches from Vaux to St. Menehould. Long-distance cannon dropped projectiles in Meaux, Vertus, Châlons, and in every railhead and concentration point within 20 miles. The plan was simply to keep worn-out allied divisions from retiring, new divisions from coming forward for relief, and to preclude the possibility of ammunition or supplies of any kind being transported to the first-line trenches. The long-distance bombardment was for the purpose of introducing confusion. When the boche wedge broke through, the German commander planned to refresh his waning stores from the wealth that would await.

The Huns were confident of success. They knew that their drives of March and April had gained much territory with nowhere near the same concentration or desperation. In addition to this, another factor lay uppermost in their calculations. The new drive was against green, largely untried troops—Americans! Of course the French would aid, but with the Yankees in full flight, a hole would appear in the line through which an irresistible stream of Prussians would pour. It may have been that a few of the wiser military leaders in Germany doubted the entire futility of the defense these Yankees would put up, but the whole morale of the German attack was built upon this philosophy.

At the time of the first German occupation, Chateau-Thierry was a thriving French city of 7,000 people. It occupied the side of a steep hill sloping northward from the right bank of the Marne. On the rocky summit of this hill stood the ruins of the ancient castle of Thierry, built as a place of refuge by Charles Martel, in 730 A. D. It possessed many fine buildings for a place of its size, chief among these being the two courthouses, the communal college, three large factories making linen and cotton twist, and the communal cattle market. Most of the homes were of stone, and while a few of the poorer folk lived on the south bank of the river, the town proper lay north. This topography is important to us only because every yard of the town hill, every corner, every basement of a stone house, was drenched in American blood before the *Friedensturm* was definitely stopped.

From Vaux to Fossoy, opposite the Hun salient which had Chateau-Thierry as its apex, were the Prairie divisions from the American Third Army Corps. These included troops from Illinois, Indiana, Iowa, Wisconsin, and Minnesota. Field artillery of the 132d, 136th, 141st, and 149th also was engaged. On the right of the Americans was a wing of the French Third Army under Meurthier. On the left, part of Pétain's Fifth Army held the line north to Soissons. At Ablois, 19 miles from Chateau-Thierry, 8,000 American marines were held in reserve.

At 12:24 p. m., on July 15th, after 12 hours of furious bombardment, German engineers made their first attempt to throw a pontoon bridge across the Marne. Though protected by a standing barrage, laid down with precision on the American firing bays, and by a continuous strafing of the American batteries, every German on the pontoon company was wounded or killed, and the matériel brought forward for use completely demolished.

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"When the first cover was reached—a line of sheds running parallel with the river—hundreds of the gallant division that had crossed the Marne lay wounded behind them. . . . . The marines faced forward sternly, taking advantage of every angle and the side of every house."

Less than 20 minutes after this catastrophe, three more bridges were started between Vaux and Jaulgonne. At the latter town one bridge was maintained, and a few German troops managed to cross and gain a footing in the outskirts of the town. The other two bridges were smashed. Six more disastrous attempts were made to build pontoon bridges in the neighborhood of Chateau-Thierry, before finally the Germans secured sufficient accommodation for their troops in crossing. The allies here were favored by previous weather conditions; it had rained steadily from the fourth to the twelfth of July, and the Marne had deepened to a torrent. Had no rain fallen, the pontoons would not have been necessary, as the normal depth of the Marne at Chateau-Thierry is three feet, which is fair fording.

A continuous attack upon the American and French positions began at four o'clock in the afternoon. While daylight lasted, the Huns were repulsed with great slaughter, but with the night they crossed in hordes. During the conflict which took place on the south bank of the Marne, 33 Bavarian and Saxon divisions and eight Prussian divisions were identified, making a total of over 550,000 German troops who actually crossed the Marne.

Outnumbered six to one, the Americans were pressed back gradually from their lines. Morning found the Huns in possession of the fire trench all along the Marne from Vaux to Gannat, and fighting in the *boyaus* and support trenches. The line was bending slowly, steadily, but it had not broken. Conscious that the eyes of the civilized world were focused on them that morning, the Yankees fought on even while messages were being brought from Foch at headquarters advising a retreat. History has recorded how one American battalion commander, frenzied by what he considered the disgrace of being forced to give way, led his men in a gallant but hopeless attempt at a flank attack. Of the whole battalion, only sixty-odd escaped unwounded back to the lines.

At noon on July 16th, the Huns had gained a substantial foothold across the river from Ville Tourbe in Champagne to

Torcy on the Clignon branch of the Marne. Despite Anglo-American-French reserves rushed to the scene the terrible advance of the gray hordes continued. Fossoy, Crezancy, Azy, and Etampes fell. The slaughter was sickening, but in pursuance of the Prussian plan of success at any sacrifice of men, the Americans were forced back, side by side with their French brothers in arms. Headquarters manifested no uneasiness, but the fact that, 30 miles back, a sizable French reserve was forming was eloquent enough.

Then, with the last of the American reserves, came the marines from Ablois. These men, who had been chafing under the restraint which held them back from a battle in which their comrades were dying, attacked like famished wolves. Within 30 minutes after their first appearance they had rounded up a Saxon regiment entire.

When the kaiser and his cohorts had been figuring the point of least resistance, and in doing so had chosen the line defended by untried Yankee fighters, they had overlooked the marines. "When we fight, the enemy does all the surrendering," is more than their slogan; it is their tradition, and every man lives up to it proudly.

The marines had no machine guns, no hand grenades. The rifle and the bayonet sufficed them. Pouring into Etampes and Fossoy, they recaptured the two towns by the sheer impetuosity of their rush. Leaving these points to be taken care of by advancing lines of infantry, the marines rushed the bridges. Less than two hours from the moment of attack they had driven the Hun out of a swath two and three-eighths miles in width, crossed the Marne, and had thrown themselves flat in the mud of the outskirts of Chateau-Thierry.

Then ensued what probably was the most remarkable battle of the whole great

war. It was a battle that must live, not only in American history but in the annals of every civilized nation. Because of that one exhibition alone it would be safe to say that no world power ever again will underrate the ability of Yankees to fight.

To understand this battle it is necessary to look again at the conditions. The steep hill, sloping up from the river, confronted the marines. On this hill was Chateau-Thierry. In Chateau-Thierry every street crossing, every basement of a house, every tower of a building or church concealed a machine-gun emplacement. It is not known exactly how many machine guns were placed in position here; the marines captured over 600, however, when they took the town. The battle was a conflict of men against machine-gun emplacements—and the men won! No one in the world ever imagined before that this could be done, but done it was. With no barrage to help them, with no explosives of any kind for demolition, the soldiers of the sea conquered the death-spitting pill boxes and nests supposed to be impregnable to anything short of T. N. T.

How could they do it? Marksmanship! In that one word lies the answer.

Before ever the marines saw a battle field, each man received a training with the rifle such as never before was given to any soldier. It may not be wise quite yet to describe this training. Suffice it to say that at the conclusion of this training each man was tried out on six ranges. He shot ten cartridges at a target 200 yd. distant, and the same number at each of five additional ranges, namely, 300, 400, 500, 600, and 700 yd. At each range a bull's-eye counted five; a bull's-eye was of 18-in. diameter at 200 yd. At 700 yd. it was one yard in diameter.

If, on his 60 shots, he made a perfect score of bulls, each marine could total 300. Eighteen of the men who attacked at Chateau-Thierry had equaled or bettered 295!

If a man, on his try-out, made a total of 202, he was considered an excellent shot (the average trained private will shoot about 45 under the same conditions) and was given a grade as "marksman." If he made 238, he attained the grade of "sharpshooter." If it mounted to 252, he was graded "expert rifleman," which was the highest honor.

At Chateau-Thierry only ninety-odd out of 8,000—and most of these recruits—had not reached the grade of marksman, so thorough had the training proved. Nearly 6,000 were marksmen, 1,200 were sharpshooters, while the remainder were expert riflemen. A handful of these topnotchers were men who each year had shot well in the national championships.

The task that faced them as they lay in the mud at Chateau-Thierry can be stated simply: They had to pick off the machine gunners in the nests and emplacements by rifle fire! At ranges varying from 50 to 500 yd. they picked the slits in pill boxes, the face that peered over an automatic Mauser barrel, through a basement window, the eyes that leered down at them from roofs, chimneys, towers, and steeples. It was life or death, victory or defeat. While the boche "typewriters" chattered down ominously at them, they squirmed along, picking off gunners by the dozen.

When the first cover was reached—a line of sheds running parallel with the river—hundreds of the gallant division that had crossed the Marne lay wounded behind them. There was no time to tend to them, no place to take them. The marines faced forward sternly, taking advantage of every angle and the side of every house. It was straight Apache warfare. A marine would crawl around a corner. "Br-r-r," would go a Hun typewriter from an unexpected point and he would fall. His comrades, making a detour, would locate the emplacement, and then they would proceed to get revenge for the death of their comrade. While one of their number decoyed the gunner by holding out a helmet on a stick, the others would wait with leveled rifles. The second his face showed, a half-dozen bullets would hit him, and the gun would be out of action temporarily. Before another gunner could take his place, a short charge and sharp work with the bayonet would finish the rest of the gun crew.

At noon next day infantry moved forward to relieve the marines. The detachment found Chateau-Thierry fully occupied by the remnant of the gallant division. As the word was flashed back to headquarters scores of stretcher bearers started for the town. The wonder of the tremendous achievement was in the mind of everyone. The sad part of it was yet to be counted. In dead and wounded in this battle, the marines lost 4,700 men out of 8,000.

It is necessary to look only at the events of the next few days to see how far-reaching were the results of this engagement. Foch, finding that after all his final re-

serves would not be needed to block the road to Paris, threw them on the line from Vaux to Soissons. How badly the German morale had been crushed by the reverse was shown by the rapid advance made by this detachment. In three days they had pushed the disheartened boches back from five to nine miles, and the retreat had just begun. All the world knows how the *Friedenssturm* ended.

Left: A Modern, Efficient Way of Transporting Live Stock: The Trailer Is Strong but Not Heavily Built and can be Attached Quickly. Right: The Rear-End Gate, When Let Down, Serves as a Gangplank. The Running Gear Is Similar to That of a Light Truck

RANCH LIVE STOCK CARRIED IN AUTO TRAILER

A western cattle rancher has found that he can make quick deliveries of live animals by the use of a live-stock trailer which attaches to the rear of his automobile. It has but two wheels, which are of the size used on auto trucks and are equipped with hard-rubber tires. A stanchion is incorporated in the front end of the carrier, while the end gate is made extra strong so that it can be let down for use as a gangplank.

NEW PLANES TO FAR SURPASS ANYTHING YET ATTEMPTED

That the world has seen but the beginning of the building of monster aeroplanes is indicated by plans for new air craft, some features of which have recently been made public. It is learned that in both America and Great Britain plans are being made for the manufacture of 5,000-hp. machines, with which it is hoped to fly across the Atlantic. But far surpassing these bold undertakings is the plane projected by Caproni, the famous Italian aeroplane constructor, which will be equipped with motors aggregating 18,000 horsepower.

CYCLIST MAKES DARING LEAP TO AID CHRISTMAS FUND

While there is no apparent connection between circus "stunts" and contributing to good causes, the former has proven a decided help to the latter in many "drives" for funds. Recently, in a campaign in New York, a daring bicycle rider was engaged to make a 185-ft. leap across a street, as shown, landing safely in a tank of water.

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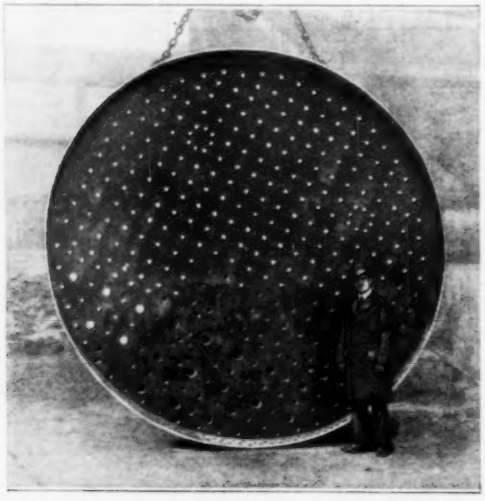
Famous Circus Cyclist Advertising a Christmas Charity by Making a 185-Foot Leap from an Incline into a Tank of Water

THIRTEEN-FOOT BOILER HEAD MADE FROM SINGLE PLATE

One of the largest boiler heads ever constructed from a single plate was made



One of the Largest Boiler Heads Ever Made from a Single Plate: It Measures 13 Feet in Diameter and Is More Than One Inch Thick

recently for a shipbuilding company in Portland, Me. It measured 13 ft. in diameter and 1 3/16 in. thick. A car had to be built according to special design to carry it to its destination.

POSSIBLE METHOD OF MAKING DIAMONDS PROFITABLY

While it has been known for some time that minute diamonds can be produced in the laboratory with suitable apparatus, thus far their manufacture in sufficient size and quantity to be profitable has not been successfully attempted. Now, however, after years of quiet experimenting, a well-known British inventor and scientist is inclined to the belief that fair-sized gems can be produced on a commercial basis. The method which he suggests is that a large mass of iron, alloyed with other elements, be submitted to suitable heat treatment, and after setting, but when still at a temperature permeable to gas, be subjected to carbon monoxide at a pressure of about 1,000 atmospheres for a long time. It is thought that diamonds in payable size and quantity might be obtained in this manner. The long list of experiments performed includes heating carbons and carbon compounds when under great pressure, by means of a central conducting core through which an electric current was passed. But it is interesting to note the inventor's conclusion that on the whole there was no evidence that diamonds had been produced by any of the chemical reactions brought about by these means. The apparatus used by him in this work involved a heavy outlay.

NEW CHIMNEY AT ANACONDA SURPASSES ALL OTHERS

The world's record for the tallest chimney is one which has not remained long with any one structure in the last few years. For a time the stack, 570 ft. high, at Sagonoseki, Japan, overtopped all others. Then there was built a 571-ft. chimney for a large smelting company at Tacoma, Wash. Now a new chimney has just been completed at Anaconda, Mont., which surpasses all the others, being 585 ft. high. Its inside diameter is 76 ft. at

Left: Foundation of the Great Stack, Containing 5,000 Cubic Yards of Concrete. Right: The Tallest Chimney in the World, 585 Feet High, with a Smoke Passage 76 Feet in Diameter at the Base, Capable of Transmitting 4,000,000 Cubic Feet of Air and Gas per Minute, at a Velocity of 24 Feet per Second

PHOTOS COPYRIGHT, WESTERN NEWSPAPER UNION

Left: A Bit of Belgium Transplanted to Staten Island, New York; one of the Belgian Refugees Who has Settled in This Country and Still Uses a Dog Team and Cart, Typical of His Home Land. Right: The Collar Which Staten Island Belgians Use in Training Their Work Dogs; the Short, Blunt Spikes do Not Hurt the Dogs, It Is Claimed

the base and 60 ft. at the top, while the corresponding dimensions of the Tacoma stack are 39 ft. and 23 ft. 11 in. A chimney at Great Falls, Mont., is 506 ft. high and 50 ft. in diameter at the top. The Washington monument is 55 ft. square at its base and 555 ft. high, and by cutting off a very little of its corners it could be set in the smoke passage of the enormous Anaconda structure.

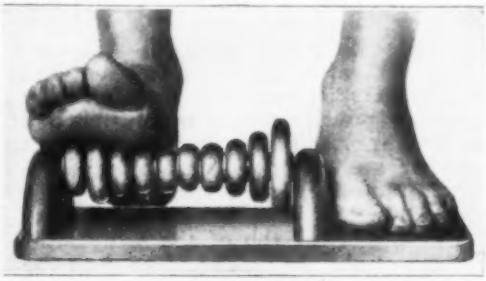
The stack will transmit 3,000,000 cu. ft. of gas plus 1,000,000 cu. ft. of cooling air per minute, at a velocity of 24 ft. per second. It contains 2,300,000 radial bricks, equal to 7,000,000 common brick, and is part of a $2,000,000 smoke-treatment plant connected with a smelter. This plant is designed to catch no less than 240 tons of solids per day, or 88 per cent of that now going to waste through smaller chimneys. There is a complete recovery of the arsenic, or about 35 tons per day.

BELGIANS ON STATEN ISLAND RETAIN OLD CUSTOMS

When the Huns invaded Belgium, several of the fleeing families sought refuge in Staten Island, New York, where they have settled permanently, adopting many American ways, of course, but clinging to certain home-land customs which are of much interest to their neighbors. One of these is the use of dogs as draft animals. Dog teams are hitched to two-wheel carts, loaded with milk or vegetables, which are made like hundreds of others to be found in Belgium. As the accompanying picture shows, the animals wear muzzles of special design, which do not interfere with eating and drinking. A special collar, made in part of pronged egg-shaped units, is used in training the dogs to work.

NEW FOOT-MASSAGE DEVICE FOR FALLEN ARCHES

Seeking relief from fallen arches, an engineer has invented a muscle strengthener with which the benefits of massage and exercise can be applied to the bottom of the foot. It consists of a series of wooden disks of varying diameters, mounted on a rod in such an order that they thoroughly massage the entire sole when the foot is moved back and forth over them, causing them to revolve. It

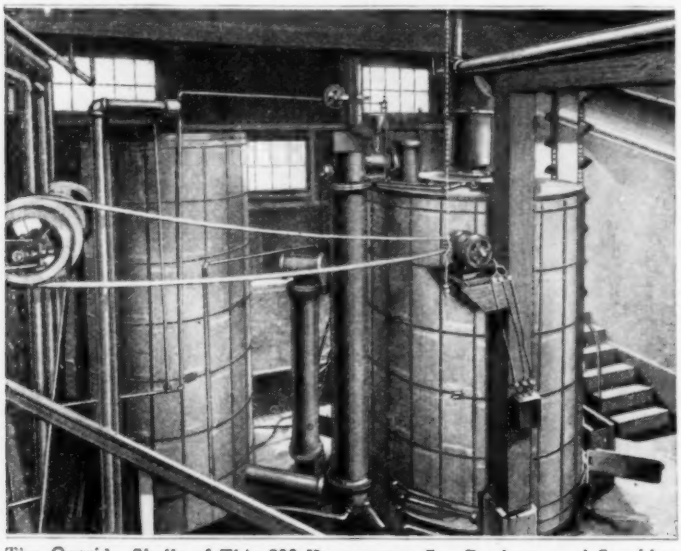


Foot Exerciser Designed to Strengthen the Muscles of the Arch, Stimulate Circulation, and Relieve Strain When the Feet are Tired from Much Walking

is claimed that this treatment not only tends to strengthen the muscles, but also stimulates circulation and gives relief after hard walking. It is designed for home or gymnasium use.

GAS PRODUCER'S OUTER SHELL MADE OF CONCRETE STAVES

Reinforced concrete has been used instead of steel in the construction of a 200-hp. gas-producing plant. Durability



The Outside Shells of This 200-Horsepower Gas Producer and Scrubber are Made of Tongue-and-Groove Reinforced-Concrete Staves, and are Insulated against Heat on the Inside

is one of the chief advantages said to result from this radical departure from standard practice. Deterioration of steel at the bottom of the gas producer, where wet ashes come in contact with it, frequently destroys the shell long before the rest of the apparatus has outlived its usefulness. The same thing holds true of the scrubber shell, the life of which is also shortened by corrosion. By the new plan the shells are built of tongue-and-groove reinforced-concrete staves. The joints are filled with a fireproof cement to provide for expansion and contraction, and the concrete is protected from heat by insulating powder placed between it and the fire brick. The staves used in the scrubber are made with waterproof cement and treated with asphaltum paint. The top of the gas producer is made of cast iron, and the top of the scrubber is of sheet steel. By arrangement with the builders of these shells local contractors may use their molds for making staves, thus saving freight charges.

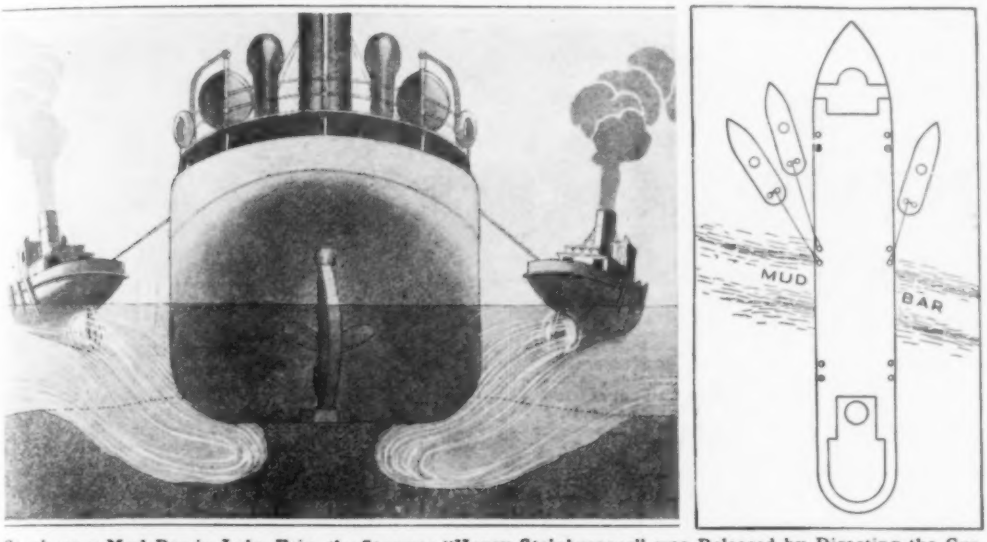
¶The coming of peace has caused a revival of the proposal to establish a large floating dry dock at Kingston, Jamaica, in anticipation of increased shipping via the Panama Canal.

SEEK TO IMPROVE LIFE ON MOUNTAIN FARMS

The little semiarid farms, giving scant subsistence to more than 3,500,000 people in remote mountainous sections of West Virginia, Kentucky, Tennessee, Virginia, and North Carolina, are to be made truly profitable if the campaign started by the Department of Agriculture produces the results sought. There are approximately 500,000 of these mountain farms, 10 to 35 miles from any railway, which give the tillers an average income of $100, the rest of a meager livelihood being obtained by working in mines and lumber camps. The department has had its representatives living on farms of this sort, and by practical tests they have found ways by which the annual receipts from the average mountain tract can be increased to $650. Literature is being widely distributed among these mountain folk telling them how to apply simple scientific principles to their efforts. For example, instead of allowing the land to "rest" and grow up to weeds periodically, rotation of crops is urged. The value of using more fertilizer and keeping more stock is pointed out, and just how coöperative creameries can be started is explained. Women demonstrators have given lessons in household management, cooking, canning, sewing, making butter, and so on.

CURRENTS FROM TUGS' SCREWS DIG MUD FROM UNDER SHIP

Powerful currents set up by the churning propellers of three tugs, made fast alongside, freed the steamship "Henry Steinbrenner" from a bar in Lake Erie, at the mouth of the Detroit River, some time ago. Inbound and loaded with 2,000 tons of coal, the vessel ventured from the marked channel to save time, and met with grief. It struck at right angles a ridge, some 15 ft. wide and 19 ft. below the surface. The ship, drawing 20 ft., mired in a foot of mud and came to a dead stop, from a speed of 10½ miles,

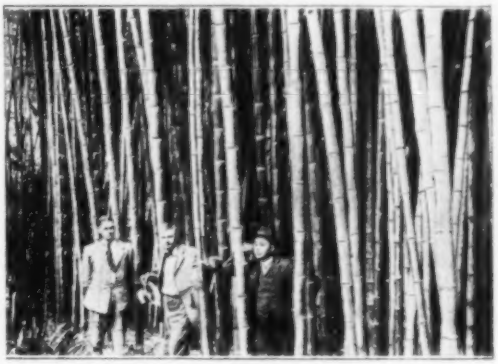


Stuck on a Mud Bar in Lake Erie, the Steamer "Henry Steinbrenner" was Released by Directing the Current from the Propellers of Three Powerful Tugs against the Bar, Which was Gradually Removed. The Diagram at the Right Shows the Relative Positions of the Steamer, the Tugs, and the Mud Bar When Work Began

in half of its 500-ft. length. When tugs failed to swing it off the bar, dredging was begun. One of the tugs took up its position on the starboard side, and the other two on the port side. Fast with three-inch hawsers, they pulled forward and outward so that the strong currents of water set in motion by their screws shot against and ran abaft and downward along the sides of the freighter. The operation was continued for three hours, the tugs being slowly swung from side to side about 30 ft. forward of the bar. When soundings were made it was found that a foot of mud had been dredged. The vessel's own screw was then started in reverse, so as to throw a strong current of water forward along the keel. This, wedging between the opposing currents from the tugs, swept out much of the mud that remained at either side. An hour later, after a total of four hours' work, the freighter responded to the pull of the port tugs, and the engineer put full steam ahead. The combined energy of the three tugs and the steamer did the trick, and the latter, unharmed, was floated.

MAY USE BAMBOO STALKS AS TELEPHONE POLES

This spring tests are to be made of bamboo telephone poles cut from a bamboo forest of several acres which was started six or seven years ago in the San Joaquin Valley, California. The canes have attained a height of 40 to 60 ft., and in some cases are 8 in. in diameter. Those interested in the project are hopeful that, with proper protection against decay underground, the stalks will prove satisfactory for use on certain lines. Their first cost would be far less than wood.

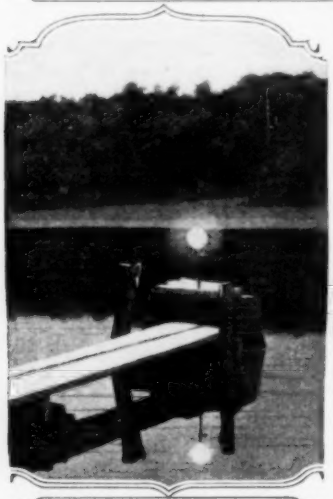


Bamboo Forest in San Joaquin Valley, California, from Which Canes are to be Cut for Use as Telephone Poles: The Canes, being Light, can be Handled Easily, and Their First Cost Is Low

¶A peace celebration, different from any other rejoicing over the signing of the armistice, was the restaging for the first time in a generation of the Sioux Indians' "victory dance" on one of the reservations in the Northwest. The last time this primitive ceremonial was participated in, it is said, was on the evening of the massacre of General Custer's band by Sitting Bull's braves.

CIVIC FEATURES THAT PROMOTE THE COMFORT

Because of Differences in Traffic Needs, the Width of Cordova Street, Alhambra, California, is Changed from 60 to 40 Feet at This Point. That the Decrease in Width may Not be Offensive to the Eye, Hedges and Ornamental Lights have been Placed Here



A Remarkable Lamp over a Mill Pond in Decorah, Iowa: Quantities of Decaying Vegetable Matter, Accumulated in the Bottom of This Pond, Give Off a Marsh Gas, Some of Which is Collected in a Weighted Barrel and Supplied to This Lamp

Motorists Entering a Western Town Inquire about Three Things — the Road, Population, and Altitude. The Latter Governs Carburetor Adjustments. Cheyenne Furnishes the Desired Information on This Neat Bulletin Board

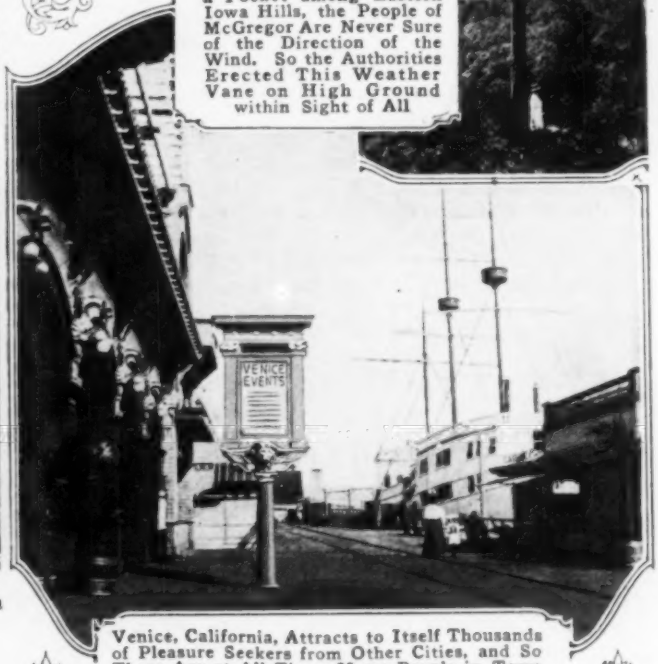
In Belle Isle Park, Detroit, Michigan, Which Is One of the Most Attractive Municipal Recreation Centers in America, Is This Big Rustic Bird House Made of Logs and Set High above the Ground So That It Serves Also as a Shelter for Many Pleasure Seekers

By Lettering That Is Unmistakable, Motorists Passing over This Bridge near Tama, Iowa, are Informed That They Are on the Lincoln Highway. The Unusual Width of the Structure, the Floor Laid at Grade, and Lights Like Those Found in Cities, Are Features That Delight Every User of the Thoroughfare

A Reminder of Pioneer Days Preserved for Future Generations: This Replica of an Early Settler's Cabin, in Crapo Park, Burlington, Iowa, Is the Rendezvous of Natives of the Hawkeye State. Here They Frequently Gather to Recount Their Hardships and Adventures

Because of Its Location in a Pocket among Eastern Iowa Hills, the People of McGregor Are Never Sure of the Direction of the Wind. So the Authorities Erected This Weather Vane on High Ground within Sight of All

It Is Essential in the West That Campers be Good Housekeepers, Otherwise Refuse Becomes Offensive and Forest Fires are Started. As a Reminder, This Sign has been Erected in Shoshone National Forest, on the Route to Yellowstone Park



Venice, California, Attracts to Itself Thousands of Pleasure Seekers from Other Cities, and So There Are at All Times Many People in Town Unfamiliar with Events and Places of Interest. That the Necessary Information may Be Available for Visitors, This Large, Ornamental Bulletin Board has been Set Up on the Pier

ECONOMIZE RUBBER IN MAKING NOVEL HEELS AND SOLES

The scarcity of rubber has caused manufacturers, wherever possible, to reduce the amount of that material used in various articles. An example of this is to be found in skeletonized rubber soles and heels of European make. Considerable rubber has been saved by making them without centers. The edges are beveled and holes are provided for small screws or nails, while the wearing surface is corrugated transversely. The same makers also produce a full sole of rubber with beveled edges.

GRASSHOPPERLIKE MACHINES KEEP AIRDROME MOWED

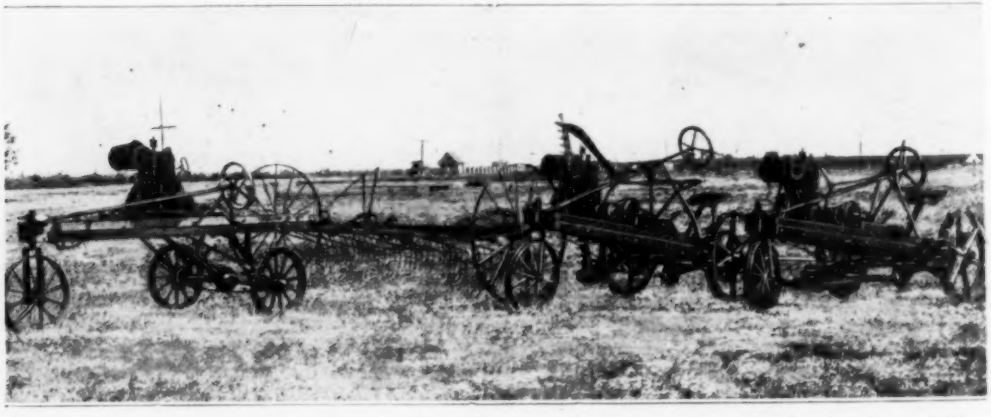
"Everman scouts" are peculiarly designed and constructed machines, but at the Everman flying field, where they are in use, they are giving splendid service. Contrary to what one would expect, Everman scouts are not in the least aeronautically inclined. They are motor-propelled hybrids that have contributed to America's aerial preparations by keeping the turf closely cropped and well raked at Everman field, thereby facilitating the work of the student pilots. A whole squadron of the machines has been built of discarded farm machinery and aeroplane parts by mechanics at the post, who describe them as being grasshopperlike both in design and speed.

EFFICIENT PARACHUTES USED BY HUN FLIERS

There is good reason to believe that had the war continued a few months longer, airmen generally would have been equipped with parachutes. A strong basis for this contention is the fact that parachutes were already in use by the enemy. During the last few days of fighting, several flying Huns saved themselves by leaping from flaming aeroplanes and floating gently to the ground beneath bellied parachutes. One of these airmen landed a couple of miles behind the American lines after jumping from his plane, which had been fired by incendiary bullets from a Yankee's machine gun. After being taken prisoner he explained how the life-saving device was used. Strapped to his body, it was folded and placed like a cushion on the seat of the plane. When it was necessary to abandon the plane, it was turned, nose up, at a sharp angle. At the instant the machine, nearly perpendicular, was about to stall, the flier leaped free from it, the parachute opening in a second or two and carrying him safely to the ground. American airmen who inspected the parachute were loud in their praise and strong in their approval of it.

REMOVABLE FENCE FOR USE ALONG PARADE ROUTES

The authorities of a large city have provided the police with a special fence, which can be quickly erected along the curbs of streets through which parades are to pass, and as quickly taken down when no longer needed to keep back the crowds. The posts are of turned wood with sharp



Built with a Triangular Frame, High at the Front End and Mounted on Three Wheels, the "Scouts" Mow and Rake the Airdrome Efficiently. Three of the Machines are Shown Above

Left: Near View of Removable Fence Showing an Extra Cable for a Near-By Crossing, and an Extra Post and Collar. The Position of the Latter, in a Post Hole, Is Shown in the Diagram. Right: Spectators Kept in Place by Fences of the Type Shown

points that fit into holes made in the pavement. added To give the posts metal stability a flanged the top collar is fitted into of each hole. A stout cable fastened to the top of the posts is stretched the length of the parade route except at street intersections. There lengths of cable are laid one side, to be strung just before the parade passes. The parades are followed by wagons, into which the posts and collars are gathered, while the cable is wound on drums.

SCENES AND EVENTS OF WAR RECORDED ON FILMS

For the first time motion pictures are being made an important adjunct to printed pages of history. Officials at Washington in charge of compiling a pictorial history of the war have taken, and will continue to take, many movie scenes which undoubtedly will tell stories that no descriptions or still pictures could ever convey. Not only on the western front have the camera men been turning their cranks, but in remote Palestine, as well. It is said some very fine films have been made of the British forces at Damascus, by the Sea of Galilee, and elsewhere.

¶More than once mud from airmen's boots has caused serious trouble by interfering with the operation of control levers in an aeroplane, so a flier has devised a mud scraper conveniently attached to the side of his machine, which he uses before entering the cockpit.

HUN HELMETS ADORN SANDBAGS ABOUT FRENCH STATUES

A display of war trophies, showing in grim fashion something of the great toll the French exacted from the enemy, was

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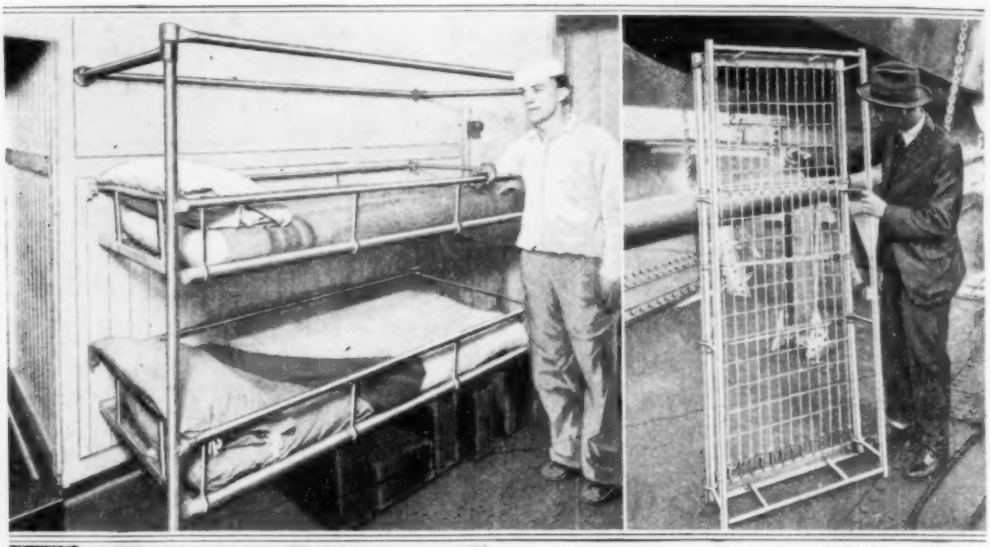
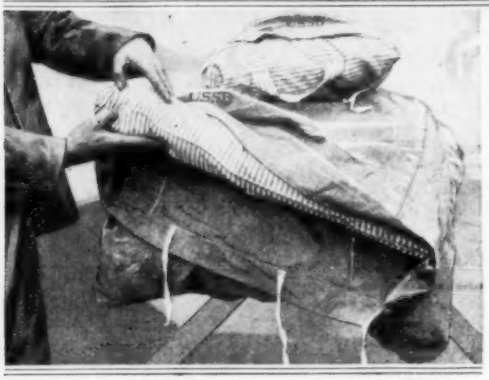
A Grim Reminder of War's Toll: Hundreds of German Helmets Adorning the Sandbag Protection Built about a Paris Statue

to be found at the entrance of the Tuileries Gardens, in Paris, during the closing weeks of the war. At this point stand two large statues which were shielded by walls of sandbags. Arranged in geometric lines on all sides of these coverings,



PHOTOS, COPYRIGHT, INTERNATIONAL FILM SERVICE

Left: Two Beds of the Type Which the United States Shipping Board is Furnishing Sailors and Firemen on Its New Fleet. Right: Inspecting the Springs, Which Are of the Most Modern Mesh Type, Set in a Strong Iron Frame



A Mattress and Pillow, Filled with Soft Tropical Fiber, and Provided with Denim Covers, Which can be Removed for Cleaning

like great rounded beads, were hundreds of helmets that had been captured from the Germans.

MODERN BEDS FOR SAILORS OF MERCHANT MARINE

The United States Shipping Board has banished the "donkey's breakfast," as sailors call the bag of hay or straw which served as a mattress for members of a ship's crew, and is supplying sanitary, comfortable beds in its stead. The springs are of the latest mesh type, attached to pipe frames having closed joints which prevent vermin from being harbored within. The whole bed can be removed from its metal supports for washing, painting, or inspection. With each set of springs is a mattress and pillow filled with a soft, resilient tropical fiber, known as kapok, which will remain buoyant in the water for about 48 hours, supporting many times its own weight, so that each of these articles will serve as a life preserver. Denim slips are provided for the pillows and mattresses, and warm blankets and spreads complete the equipment.

BLIND AND DEAF WOMAN FLIES IN AEROPLANE

What is said to have been the first flight made by a blind and deaf person was that undertaken by Miss Helen Keller, who is known throughout the world for her remarkable achievements in spite of being deaf, blind, and formerly dumb. The flight took place near Los Angeles, with a well-known airman at the wheel, and lasted nearly an hour. Miss Keller was enthused by the experience.

ALASKA BEGINS SHIPPING ANTHRACITE COAL

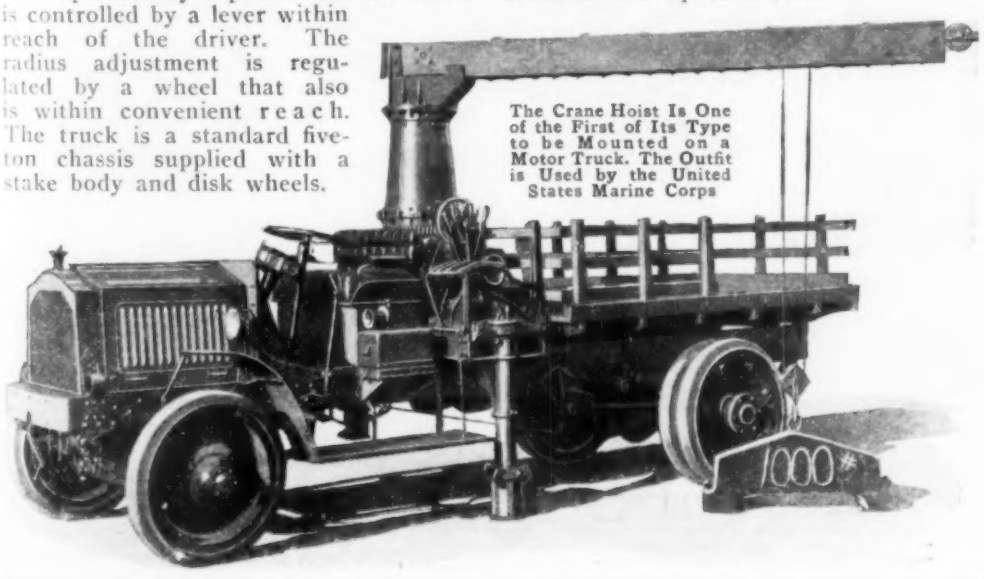
The new Alaska Anthracite Railroad, which is 22 miles in length, has been completed, it is announced, and the first train-load of coal, consisting of 100 tons of anthracite, has arrived at tidewater. This event is of much significance to the Pacific coast region, which has scant coal resources of its own, for it marks the releasing of vast fuel reserves which heretofore have remained inaccessible.

SALT HAM HELPS NAVY ELEVEN WIN ON GRIDIRON

To very salt ham, served once a week, sailors in training on Chicago's municipal pier give a large share of credit for their football team's phenomenal success the past season. Football experts, who know the rigid discipline under which the navy men live and their rather monotonous diet, on hearing that the navy eleven was to have a season a month longer than is usual, predicted that the team would "go stale." But the commissary steward, once a player himself, believed he could keep the men in good fettle despite this handicap. His plan was to serve very salt ham once a week, causing the players to drink quantities of water. In the opinion of those who ventured thus to disregard conventional training rules, this kept the men from "going stale" by relieving their systems of congestion. The team's victories are pointed to as a vindication of the diet.

CRANE IS MOUNTED ON TRUCK USED BY MARINE CORPS

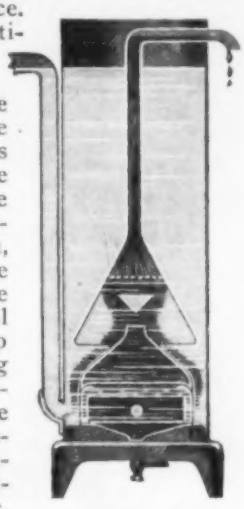
Included in the motor equipment of the United States Marine Corps is a specially outfitted truck that mounts a crane hoist with a 10-ft. boom. Jacks are provided at opposite sides of the chassis to relieve the frame of undue strains. Working at a radius of about seven and a half feet, the hoist has a lifting capacity of two tons. It is operated by a power take-off which is controlled by a lever within reach of the driver. The radius adjustment is regulated by a wheel that also is within convenient reach. The truck is a standard five-ton chassis supplied with a stake body and disk wheels.



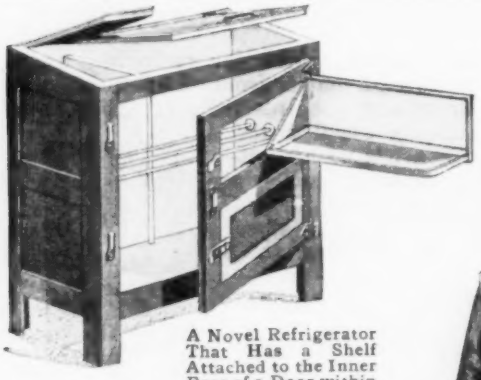
The Crane Hoist Is One of the First of Its Type to be Mounted on a Motor Truck. The Outfit is Used by the United States Marine Corps

COMPACT OIL SEPARATOR OPERATES BY GRAVITY

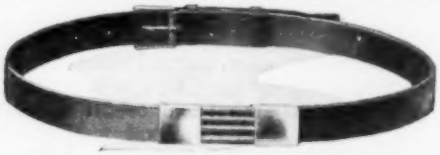
A new separator for removing water and foreign matter from oil operates without power, requires little attention, and occupies small space. It consists of a vertical cylinder containing especially arranged baffles. The oil enters near the bottom and flows into a circular guide designed to allow the solid matter to settle to the bottom, whence it can be drawn off. As the cylinder fills, the oil and water pass up through an opening in the top of a conical cover over the guide. The oil, being the lighter, accumulates in a second conical baffle, suspended above the one just mentioned, and, as the level of the water rises, passes off through a pipe which is an extension of the cone. A second outlet, for the water, is connected at the bottom of the separator and rises to the level at which it is desired to maintain the water within. If further cleansing of oil which has passed through the separator is desired, a series of filter pads is used.



SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



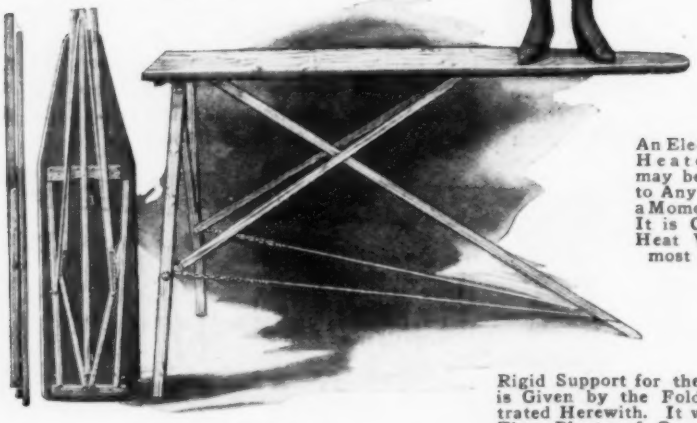
A Novel Refrigerator That Has a Shelf Attached to the Inner Face of a Door within a Door



Men's Belt, Made Elastic by Insertion of Four Coiled Piano-Wire Springs at Rear

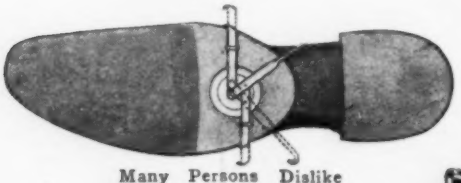
Quite an Appropriate Memento of the War, for Those Who Have a Relative in the Service, Is the Service-Star Candlestick, Two Forms of Which are Shown

An Unusual Souvenir for Patriotic Functions—a China Bee Decorated in Red, White, and Blue. It may be Worn on a Coat Lapel or Pinned to a Place Card



An Electric Water Heater That may be Attached to Any Faucet in a Moment's Time: It is Claimed to Heat Water Almost Instantly

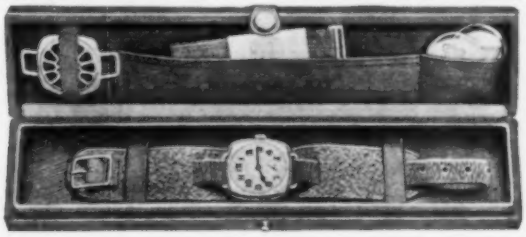
Rigid Support for the Ironing Board is Given by the Folding Rack Illustrated Herewith. It will be Observed That Plenty of Open Space is Provided beneath the Board at the Small End



Many Persons Dislike Wearing Clumsy Rubber Shoes in Rainy Weather. For Them the Rubber Sole with a Mechanical Clamp, Here Shown, is Especially Intended

Convenient Serving Fork with Pusher Attachment That Enables a Portion of Meat to be Dislodged Readily from the Tines: The Device Has No Spring. It is Actuated with the Forefinger

An Economical Oven That Fits in the Doorway of a Furnace and Utilizes the Latter's Heat, Thereby Obviating Necessity of Using a Range



For the Man in the Service: A Wrist-Watch Set with an Extra Strap, Two Extra Crystals, and a Crystal Guard

This Military Wrist Watch Includes a Small Compass, Obviously of Convenience to the Soldier or Sportsman

Patriotic Emblem for Coat Lapel, Framing Miniature Portrait of Soldier: The Eagle Is Gold Plated and the Flag Enameled in Colors

For the Modern Kitchen: Five Separate Wall Racks Holding Moisture-Proof Glass Jars of Different Capacities, Each Instantly Removable

Suburbanites Whose Telephone Calls Are Frequently Long-Distance Ones will Find This Three-Minute Sandglass a Most Convenient Accessory

Here Is a Screen That may be Rolled Like a Window Shade, a Feature That Meets the Storage Problem in Winter and Also Simplifies Window Washing in Summer

This Case is Supplied with a Spring Clamp That Holds One's Unbound Business and Visiting Cards in Book Form and Permits Them to be Removed One at a Time, without Disturbing the Pack

FROM A GERMAN PRISON TO THE ARCTIC

By ALFRED L. FLUDE

LAST summer, in Mourmansk, Russian Lapland, I met Harry Drope, of Brandon, Manitoba, formerly a member of the Princess Pat Regiment. He had escaped from a German prison camp into Russia, and at last into the Arctic on his way back to England, where he once more reported for duty. This is the way he told his story while we were sitting on a lifeboat on the well deck of H. M. T. "The Czar," carrying 1,300 refugees, who had escaped from all over Russia, down to England.

"I was captured in 1915 and sent to a German prison camp where the food was very bad and the work was very hard. The worst time in the life of a prisoner under the Germans is those first weeks before the Red Cross locates him and sends him enough food to keep body and soul together. We were given a few ounces of black bread daily and a bowl of soup with no food value, and which smelled so badly that it was simply impossible to eat it.

"Within a few weeks I was transferred to a camp in German Poland, where we were employed in rebuilding the villages which had been destroyed by the Russians. It was good outdoor work, and as soon as my food packages came regularly, I thrived on it. I determined to escape into Russia, however, and planned with two Russian soldiers for the attempt. For several weeks we saved a portion of our food each day until we had sufficient for two weeks, which we thought would give us time enough for the trip. When the time came, we managed to hide behind the huge oven in the bakery, when the others returned to the barracks. At 10 o'clock we started, depending on the stars to guide our course due east. Before daylight we hid in a field of barley and remained there for the entire day. This was our procedure during the entire trip.

"I was captured in 1915 and sent to a German prison camp, where the food was very bad and the work was very hard."

"At the end of two weeks our food was exhausted, but we were far from the Russian lines. We went to the home of a Polish peasant, waked him, and told him we must have food. He gave us potatoes and black bread, and promised not to tell of our visit. However, we made it a rule to make these visits before midnight so we would have a good start before we could be reported to the military. We were never refused, and many of the poor people gave gladly and wished us success.

"Just as we were congratulating ourselves that the journey would soon be over, we walked right into the arms of a German sentry and were promptly arrested by him. However, three prisoners at one time were more than he could master, and before he realized what had happened, there was a mix-up in the dark, and two of us were running through the underbrush into the forest. He kept firm hold on one of the Russians, however, and that was the last we ever saw of him.

"Twenty-six days from the time we started, we reached the trenches. The Germans were on one side of a river and the Russians on the other. The German lines were well guarded and were further protected by barbed-wire entanglements, heavily charged with electricity. As we crawled along the line, we could see in the moonlight the bodies of Russians who had attempted to go through. We were hiding in a huge shell hole close by the bridge, upon which we could see a German sentry walking. Suddenly we heard the clatter of a pony and cart crossing from the Russian side. We heard a man call

to the sentry in Yiddish and finally come on toward the German side. My companion, who was a Russian Jew, called to the driver cautiously, in Yiddish. The pony was stopped and the man came toward us. He listened to the story, gave us some black bread from his cart, and asked us if we had any money. We offered him all we had, about 14 marks. 'That is too much,' he said. 'Give me seven marks.' He signed for us to follow and walked boldly back across the bridge, calling to the guard that he had forgotten to give him some cigarettes. As we drew near he told the guard that he had met two Yiddish friends who wished to go back to the Russian side, at the same time handing him the cigarettes and the money. The sentry waved us on and we walked slowly past him toward freedom. Up and down my back the chills were running, and I wondered how soon and where his bullet would strike, for I could hardly believe that he would be so easy. At last we reached the other side, and took to our heels into the shadows and were safe.

"After that it was simply a question of getting through the Bolshevik lines and into the North. Here my Russian companion was of inestimable help. At last I reached the Petrograd-Mourmansk Railroad and followed it until at last I reached the English-Serbian lines and went into Mourmansk on a real freight train. Why speak now of the hardships of the whole trip? I forget them and regard myself as unusually fortunate in having escaped.

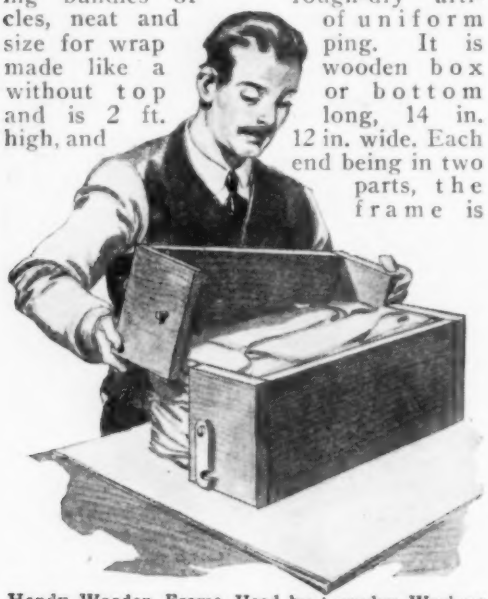
"I am going back to London to report and will probably be at the front again in less than a month. I hope the war will not end until I have had my chance to repay the Hun for what he made me and others suffer as prisoners. I wish I knew how that other Russian fared!"

"Before he realized what had happened, there was a mix-up in the dark, and two of us were running through the underbrush into the forest."

"As we drew near he told the guard that he had met two Yiddish friends who wished to go back to the Russian side, at the same time handing him the cigarettes and the money. The sentry waved us on and we walked slowly past him toward freedom."

FRAME AIDS LAUNDRY WORKERS IN WRAPPING BUNDLES

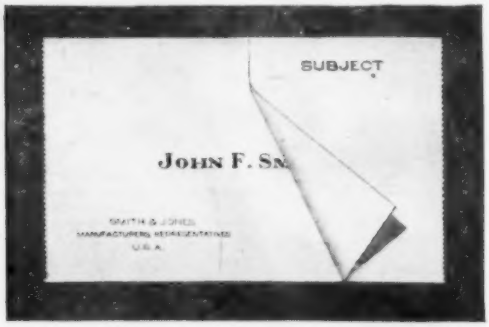
A convenient accessory for commercial laundries is a wooden frame used in making bundles of rough-dry articles, neat and of uniform size for wrapping. It is made like a wooden box without top or bottom and is 2 ft. long, 14 in. high, and 12 in. wide. Each end being in two parts, the frame is divided into halves which are held together by simple clamps, dowel pins helping to keep them in alinement. The frame is placed on the wrapping paper and the laundered material is packed into it, after which the halves are removed.



Handy Wooden Frame Used by Laundry Workers as a Form in Which Articles are Piled Preparatory to Wrapping Them into Bundles of Uniform Size

BUSINESS CARD WITH FLAP FOR BRIEF MESSAGE

Convention has been departed from in designing a business card which is provided with a flap intended to be folded either against the back or the front of the main portion of the card. At the top of the flap is the word "subject," beneath which the one seeking an interview can indicate in a few words the nature of his errand and thereby can often save time for himself and others concerned.

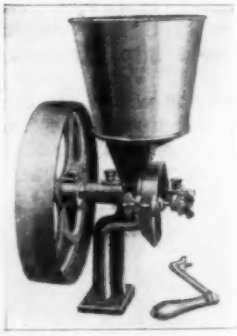


Business Card with a Detachable Flap on Which can be Written a Brief Message to the Person with Whom an Interview is Sought

NEW YORK TO ERECT ARCH AS WAR MEMORIAL

Very soon after the coming of peace New York City officials began making plans for a victory arch in honor of the Americans who fought in the great war. The proposal is to determine as soon as possible the general character of the structure and then erect a temporary arch in conformity with those ideas, before the majority of the troops return home. A number of prominent artists and architects have been selected to draw up plans and specifications. The board of aldermen has authorized the issuance of $80,000 in special revenue bonds with which the memorial will be erected on Fifth Avenue, at Madison Square.

EASILY OPERATED FLOUR MILL FOR HOUSEHOLD USE



It is believed that the war has created a demand for home-ground flours of various degrees of coarseness, which will be permanent among housewives. To meet this demand a small hand-operated mill, moderately priced, has been placed on the market. It fastens to the edge of a table and stands 19 in. high. A crank handle and a small flywheel make its rapid operation easy. The two grinding burrs are easily adjusted by a thumbscrew for grinding corn, wheat, barley, rice, rye, etc., to the desired degree of fineness.

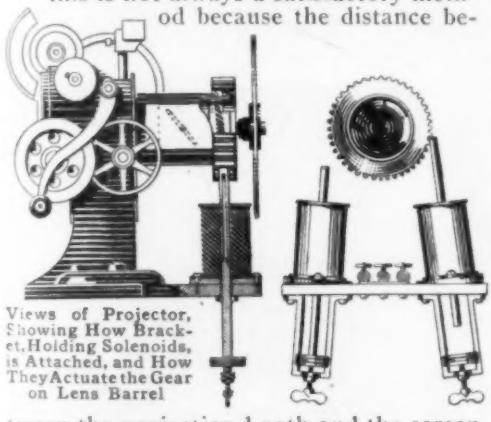
¶ Business interests in Tokyo, Japan, are planning extensive development of the port at Ominato, which is now only a small naval center at the northern end of the largest of the empire's islands, but promises to become an important transshipment point between the United States and northern Asia.

OVERCHARGING FOR HOTEL-PHONE SERVICE ENDS

One of the petty overcharges which have annoyed hotel guests in many large cities has been abolished by an order from the postmaster-general, who has control of the telephone systems of the country. This order provides that hereafter hotels, apartment houses, clubs, and similar institutions, shall not charge any guest or member more for the use of the telephone than is charged in public pay stations. The managements of these places are also forbidden to charge more for private-branch exchange stations than they, in turn, are required to pay.

FOCUSING MOVIE PROJECTOR FROM BODY OF THEATER

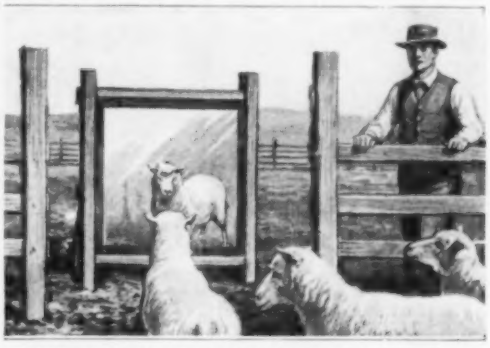
Among the recent inventions intended to improve the projection of moving pictures, there is an electric focusing system that may be controlled from any part of a theater. Usually the lens of a projector is focused manually, but in large houses this is not always a satisfactory method because the distance between the projection booth and the screen makes it difficult for an operator to determine the sharpness of a picture. The latest plan for obviating this trouble consists in fitting a ring gear over the milled head that rotates the lens barrel, and actuating the former by means of two solenoids connected in a three-wire circuit controlled by a pair of push buttons, preferably installed in the middle of the theater about 14 ft. from the screen. An operator stationed at this point is able to watch the screen and refocus the lens when needed, by pressing one or the other of the push buttons. The latter control separate solenoids, one causing the lens barrel to be moved forward, and the other backward.



Views of Projector, Showing How Bracket, Holding Solenoids, is Attached, and How They Actuate the Gear on Lens Barrel

SHEEP DRIVEN INTO PEN WITH AID OF MIRROR

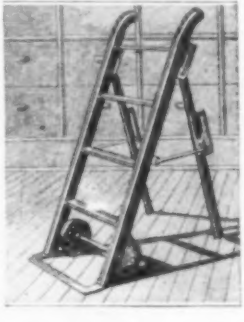
By placing a mirror, 3 ft. square, opposite the opening through which sheep were to be driven, an Australian grower has been able to get the animals to pass into pens where they were wanted, without difficulty. True to its well-known habit of following the lead of its fellows, each sheep on seeing its own likeness in the mirror thought it was another of the flock and passed through the opening at once. While the device has been employed only as indicated and by but one ranchman, so far as is known, doubtless there are many places where it could be used.



A Mirror Installed Opposite the Entrance to a Sheep Pen Makes the Animals More Ready to Enter the Gate, Because Each Takes His Reflection to Be Another Sheep Already in the Inclosure

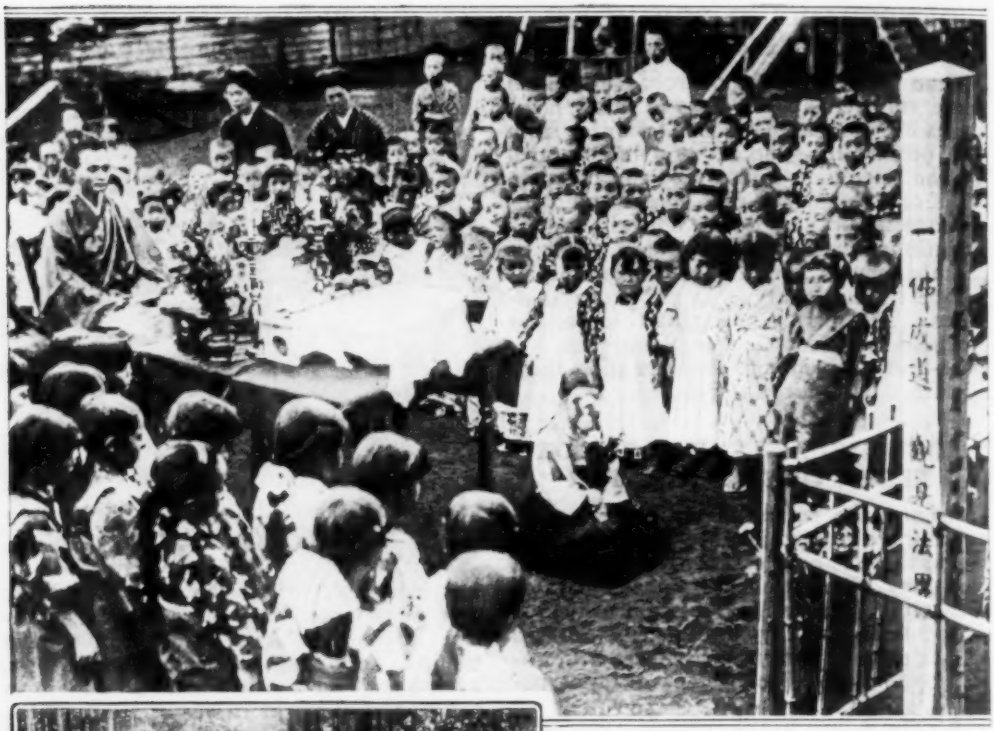
STEPLADDER AND HAND TRUCK ARE COMBINED BY INVENTOR

A hand truck that also serves as a stepladder has recently been invented. The device is fitted with four treads and at the rear side has a hinged support that fits in front of the axle, out of the way, when not in use. An additional advantage of the combination is that the support will hold the truck in loading position and thereby give the operator complete freedom when tipping or moving a heavy crate or barrel.



¶A few weeks ago a huge aeroplane carrying 35 passengers flew to Paris and return from a point 40 miles distant.

AND UNUSUAL SCENES OF INTEREST TO THEM



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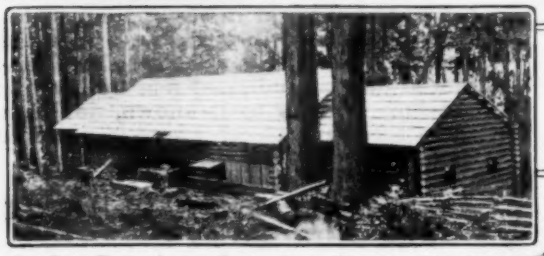
Little Children in Japan are Wonderfully Devoted to Their Dolls, and When the Time Comes to Discard Any of Them, Something Like a Funeral is Held. This Picture Shows the Oriental Little Folk from One of the Japanese Elementary Schools Attending One of These Sad Gatherings

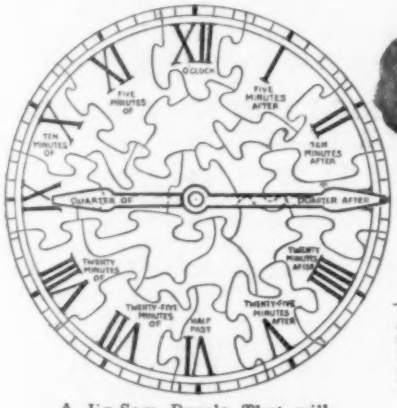


At One End of the Cabin Is a Kitchen, While the Biggest—and Most Eagerly Visited—Room Is the Dining Room, with Its Great Fireplace

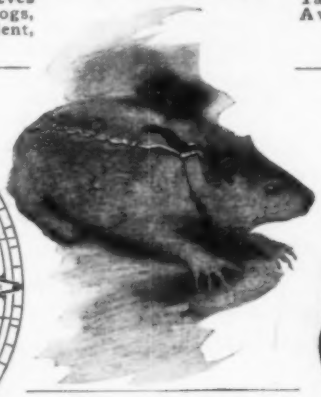
About 60 Miles from Their Home City, the Boy Scouts of Portland, Oregon, have Built This Splendid Log Cabin near Wahtum Lake, on Leased Land in the Oregon National Forest. The Building Measures 100 by 50 Feet and is Made of Peeled Silver-Fir Logs. As can be Easily Imagined, It Is the Goal of Many a Memorable Hike Taken over One of Two Beautiful Trails, Which are Maintained by Forest Rangers

There Is No Accounting for the Taste of Cats. Here Is Tommy, for Example, a Perfectly Nice Connecticut Puss, Who Went Out One Day and Brought Back a Snake for the Entertainment of His Tiger-Striped Daughter, Milly. Tommy's Master Believes That the Family Pet Started Out to Get Frogs, but, Coming upon This Snake by Accident, Simply could Not "Pass It Up"

The Closest Call the Snake Ever Had: Milly Put Her Teeth into Him a Little Way, but did Not Like the Taste, and So, after Giving Him an Awful Scare, Let Him Crawl Away, Scot-Free



A Jig-Saw Puzzle That will Help a Child to Learn to Tell Time: On Each Piece is Shown the Value, in Minutes, of the Accompanying Numeral



A "Close Up" of Steve's Ground Hog, Which, He Says, Sleeps through the Winter until Ground-Hog Day, When He Comes Out to Look for His Shadow

In Rocky Hill, Connecticut, Everybody Knows Steve Reduker, the Boy Who Lost One Leg Over Three Years Ago, and They Like Him for His Pluck and Love of Pets, One of Which, His Ground Hog, is Shown with Him

This Little Pig Never "Went to Market" or "Had Roast Beef," but He did Have Something He Liked Much Better, Namely, Milk from a Cow Which Nursed Him

GERMAN WAR-TIME CLOTH MADE OF PAPER

A war-time product of German weavers, reports of which excited not a little interest, was the so-called cloth made of paper. Photographs recently secured of specimens of this fabric show that it is very coarsely woven, the threads appearing to be as large as coarse wrapping twine. In some cases a pattern was printed or stenciled on the material. Undoubtedly a great deal of experimenting was necessary to make possible the production of even this rather crude cloth.

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Specimen of a Substitute for Cloth Made by German Weavers during the War

NEW ALL-METAL HAND TRUCK A PINCH BAR ON WHEELS

A new hand truck for moving light or heavy loads with comparative ease resembles a large-size pinch bar, mounted on three wheels. The truck is made entirely of malleable cast iron, and there are no bolts or other parts apt to need replacing. The lower end, which is inserted under the article to be lifted, is broad and slightly curved. The two forward wheels, beneath it, have 2½-in. treads and are 3½ in. in diameter, while the third wheel, a few inches to the rear, is 5 in. in diameter and has a 1-in. tread. The leverage ratio is 13½ to 1, and the weight of the truck is 34 pounds.

All-Metal Hand Truck Made Like a Pinch Bar: It will Stand Alone Vertically or at an Incline

GREATEST TORPEDO REPORTED TO HAVE 20-MILE RANGE

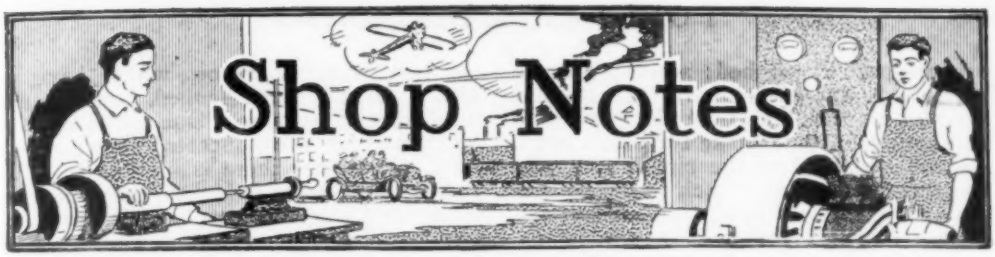
America of late has been given credit for the development of the world's greatest torpedo, a missile with a range of 20 miles. The report has been widely circulated and quite possibly is based on fact, although so far as is known official confirmation of its existence is lacking. The effective ranges of torpedoes in the past have been popularly known as approximately five miles for the largest size, and about three miles for others. The use of a torpedo against a target beyond the range of vision obviously would entail serious difficulties. Therefore, granting that a 20-mile torpedo has been placed in service, the details of its construction could be no more interesting than the means employed for its effective use.

ELECTRIC LAWN MOWER MAKES GRASS CUTTING EASY

One of the newest applications of electric motive power to machinery is a motor-driven lawn mower which is as easy to push about as an empty baby carriage. A ⅙-hp. motor is mounted on the implement and drives the blades by means of a belt, but does not propel the mower. Current is obtained through an extra long flexible cord connected with the nearest socket. The motor drives the cutting machinery while the operator pushes the implement about.

APPLE BARRELS PROVIDED WITH GLASS TOPS

An innovation at a recent apple display held under the auspices of the Illinois State Horticultural Society was the glass tops in the apple barrels. The glass used was thick and was held in place by nails in the usual way. These transparent tops made it very convenient to inspect the fruit whether the barrels were placed on end on the floor or piled in rows on their sides.



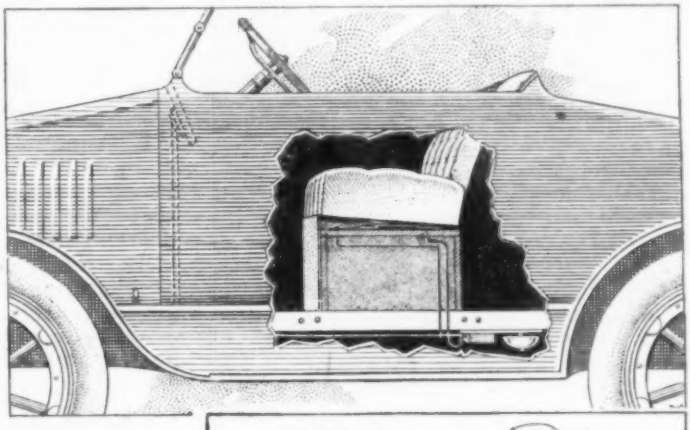
Automobile-Thief Alarm

By E. W. RANSTON

MANY good and efficient automobile locks have been called into existence by the epidemic of automobile thefts, and there is now no excuse for leaving a car unprotected. The locks in general use are of several classes, each presenting its own advantages and open to its own objections. Electrical locks for merely breaking the ignition circuit were the first on the scene, and are still used to some extent, although no expert automobile thief would be delayed by them for more than a few seconds, as he would simply connect around the "lock" with a wire leading directly from the battery to the igniter. Gasoline-line locks are useful, but somewhat complicated in their installation, and introduce the questionable element of additional opportunity for gasoline leakage. Probably the favorite method is a purely mechanical lock, on the steering gear, the starting crank, or some other essential part of the mechanism.

While all of these locks may be relied upon to prevent or at least delay considerably the work of the thief, few, if any, of them are of any assistance to the police in capturing the would-be thief. The device here described is intended to accomplish this purpose, and at the same time furnish a protective device with all the convenience of the ignition lock.

The effect of the contrivance is that, when a thief enters the car and takes his place in the driver's seat, an invisible alarm bell under the car starts ringing, and continues to ring even after the thief leaves his seat and seeks safety from the police or citizens who are sure to be attracted by the noise of the bell. The bell will continue to ring until the owner returns to the car, or until somebody finds the hidden control switch and turns it off. Of course, if the thief is ingenious enough to find this switch at once, he can turn off the alarm himself, but there is small chance of a thief working very long around a car to the accompaniment of a loudly clanging bell.



As the Thief Takes His Seat at the Steering Wheel, He Sets Going an Invisible Alarm Bell, Which Continues to Ring Until Switched Off by a Concealed Switch in Another Part of the Car

The various parts of the circuit and their connection are shown in the diagram. The materials needed are: one or more small switches to be concealed as well as possible within reach of the driver; a good, loud electric bell; a relay, or circuit breaker, such as is used on nearly all modern automobiles to connect the generator to the battery when the

proper speed is reached; some resistance wire, large enough to carry several amperes of current, and some pieces of wood and spring brass to make the seat switch. As will be noted in the circuit diagram, when the concealed switch is closed and the seat switch is afterward closed, the circuit through the bell is established, and, at the same time, the current flowing through the circuit breaker closes a circuit which connects around the seat switch so that, even though the latter is open, the bell continues to ring. The resistance coil would not be necessary if the circuit through the bell was continuous. Since, however, it is interrupted at each tap of the bell, the coil is necessary, in order to maintain a sufficient current through the circuit breaker to keep it from permitting the shunt circuit across the seat switch to open, thus stopping the alarm. The only way in which the alarm can be stopped is by breaking the main circuit, either at the concealed switch or at some other point. If properly wired, this cannot be done by a stranger without spending considerable time, which, under the circumstances, is out of the question for a thief, at least in a city or town.

The making of the seat switch will not be difficult for any electrical experimenter, and its successful working must, of course, be tested by experiment. The sketch may give a suggestion. It will be advisable to carry the two wires from the seat switch directly down below the car, where the circuit breaker, bell, and resistance coil can readily be mounted in one removable unit. As the current first comes through the seat switch, it will close the contact points; as the seat switch is opened, the current flows through the shunt circuit, including the contact points, and keeps the points closed until the main circuit is broken.

The unit under the car, consisting of the bell, circuit breaker, and resistance coil, will have two wires leading from it: one to the seat switch and one to the concealed switch. If the car is wired on the double-wire system, there will also have to be a return wire to the battery. With the grounded-battery system, there is simply a connection from the unit under the car to some screw or nut on the frame of the car.

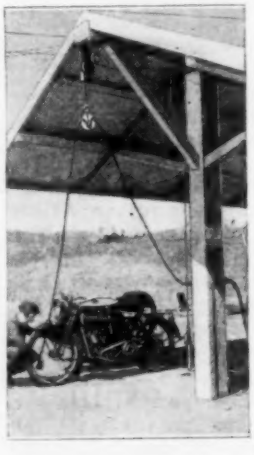
The concealed switch may be located in a pocket on the door, just behind the dash board, under a corner of the floor mat, or any other place where it will be out of sight; or it may be built into a combination, or key, lock. Ignition locks designed for use with magnetos, which have a closed circuit when locked, are readily used for this purpose. One advantage to be gained by the concealed-switch idea, however, is that there is no visible indication that the car is locked, thus encouraging the thief to get himself trapped. Car owners who regard this as a disadvantage, preferring to notify the thief in advance that the car is protected, may use a lock switch. If the thief then connects across the two wires leading to it before taking his seat at the wheel, he will not have prevented the gong from giving the alarm. Using two or more concealed switches presents an additional advantage, as closing any one of them throws on the alarm, and all must be open to throw it off.

Etching on Glass and Metal with a Sandblast

A sandblast may be made use of in many novel ways. Any part of an electric-light bulb may be frosted by covering the other part of the glass with a piece of heavy paper, and exposing to the sandblast. A similar process will serve to etch any lettering or design on any glass or polished-metal article, and a finish may be given to soft wood which gives it the appearance of being hand-engraved.

Weight and Pulleys Keep Air Hose Convenient and Reduce Wear

The usual air-hose arrangement about garages and service stations is frequently a source of annoyance to both motorists and attendants alike, and when the hose is dragged about on the ground, it is very short-lived. The weight-and-pulley mounting, illustrated in the accompanying photograph, keeps the hose up out of the dirt at all times. Its position is convenient for getting at all four wheels of a car; it is in the shade, and is not needlessly worn by being dragged out over the



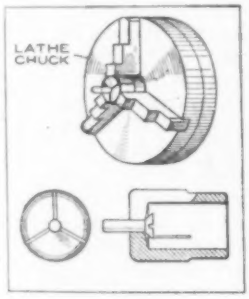
ground or left in a position to be run over by machines. This type of hose support costs little to install, and will pay for itself many times by the convenient service it renders and the reduced wear on the hose.—John Edwin Hogg, Alhambra, California.

Moving "Rusted-In" Screws

Steel screws which have rusted into place are difficult to remove. They can often be loosened by tapping the screwdriver with a hammer, or by heating, but a better way is to treat them before setting them in place with a rust preventive. Common oil will do this to a slight extent, but a mixture of graphite and tallow rubbed onto the screw, will be effective for a much longer time.—S. Leonard Bastin, Bournemouth, Eng.

Holding Screws While Threading or Turning Them

When small screws must be turned or threaded in the lathe, time is often lost because no chuck is at hand which fits the screw. A collet, to be held in the chuck, and to hold securely the size of screw for which it is designed, is made from a piece of round steel. It should be about 1⅛ in. in diameter, and its length should be somewhat greater. Drill a hole clear through it, the size of the screw to be held; then, from one end, ream this with a ¾-in. drill, to within ¼ in. of the other end. Turn down slightly the half of the piece from which the ¾-in. hole was started, so as to provide clearance. With a hacksaw, saw three or four slots, as shown, so as to form a spring collet. The number of slots should be the same as the number of jaws in the lathe chuck. The collet may be hardened, or casehardened if convenient, and its life will then be much longer. If the collet is accurately made, a universal chuck will be satisfactory to use with it; for extreme accuracy, however, which is often necessary in small work, the chuck with independent jaws is to be preferred.—E. L. Howard, Springfield, Ohio.

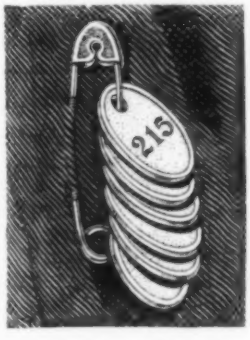


Large Kettle Inverted over Soft-Coal Fire Saves Heat

On putting fresh soft coal into a stove, an intense smoke is given off, which fouls the pipes and spreads soot over the room, besides wasting coal. A means for diminishing this was found in a large iron pot. The pot was provided with a ring on the bottom, by means of which it could be carried on the end of the poker. Immediately after putting on fresh coal, the inverted pot was set on top of the fire and was found to have the effect of causing the smoke and coal dust either to collect inside the pot or to escape around the edge, where the gas would burst into a ring of flame, consuming much of the coal dust, which would otherwise be wasted. The kettle is left on until the fresh coal becomes hot and is reduced to coke by having the gas roasted out of it; the pot is then removed, leaving a coke fire, which burns and lasts very well.—A. S. Thomas, Amherstburg, Ontario, Can.

Carry Tool Checks on a Safety Pin

In shops where each workman has a number of tool checks bearing a number, one of which he deposits in the tool room as a receipt for a tool taken out, the loss of these checks may sometimes involve unpleasantness. A safer way of carrying them than in the pocket is to sew a large, strong safety pin to the overalls or shop clothes and hang the checks upon it. The checks can be removed or replaced with either hand, so that the other one is left free for carrying the tools.—C. C. Spreen, Detroit, Mich.



Scaffolding without Nails

On a repair job where the scaffolding could not be attached to the side of the

Brackets for Scaffolding Supported by Long Braces Reaching to the Ground are Found Useful on Repair Jobs

house, and it was not desired to build up a whole structure from the ground, a contractor designed a number of brackets, which enabled him to get at the work conveniently and safely after very little preparation. The brackets were made of 2 by 4-in. scantlings, each brace consisting of two pieces nailed together so that the central portion, where the greatest stiffness is required, is full 4 by 4 in. The braces fit snugly into the brackets, and the whole scaffolding can be removed in a few minutes and carried to another job.—W. K. Crosson, Detroit, Mich.

Keeping Brushes Soft with Paraffin

Keeping paintbrushes soft by placing them under alcohol, turpentine, or other such liquids, is a somewhat expensive method, especially when the brushes are to be out of use for long periods. If a brush which is still moist with paint or shellac is dipped in melted paraffin several times, so that a heavy coat of the paraffin adheres to it, the brush will retain its softness indefinitely, the paraffin preventing any evaporation. To remove the paraffin, merely pull it off; it will come easily, leaving the brush as fresh as when the paraffin was applied to it.

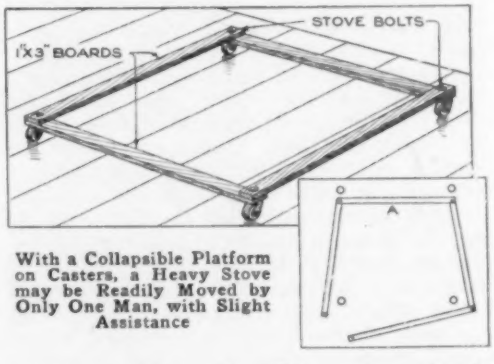
Keep the Lamps Clean

A simple explanation of a gradually failing light in many shops is to be found in that lamp globes and shades are not kept clean and, therefore, do not transmit or reflect the light properly. A little attention to keeping the lamps clean will often enable a shop to avoid the necessity of installing more lights or to have much better illumination with those already installed.—William Philip, Bloomfield, N. J.

Small Truck Aids in Moving Stove

Here is a device that is cheap and easily made, and will enable one grown person, with the help of a child, to move quite a large stove. The frame, of strips, 1 by 3 in., is bolted at three corners with ¼-in. stove bolts, and casters are fastened beneath with screws. In the fourth corner the bolt is first put through the upper board only, and the nut put on to hold it firmly in place. The platform should be made the proper size so that the stove legs may rest on the corners right over, or slightly to the inside of, the bolts. If this is not done there will be some trouble in putting the stove in place.

To use, have the loose corner open, and place the frame near the stove legs. Tip the stove forward so that the strip A may be put into place beneath the back legs. Then, lifting the front, draw the frame together and into position. The bolt in the top strip should drop into the hole in the lower one, and be fastened with a nut. Now the stove may be wheeled into the exact position desired, and by reversing the directions given above may be quickly unloaded. It is better to load the heavy end first and unload it last. Through the summer it will do no harm to let the stove



With a Collapsible Platform on Casters, a Heavy Stove may be Readily Moved by Only One Man, with Slight Assistance

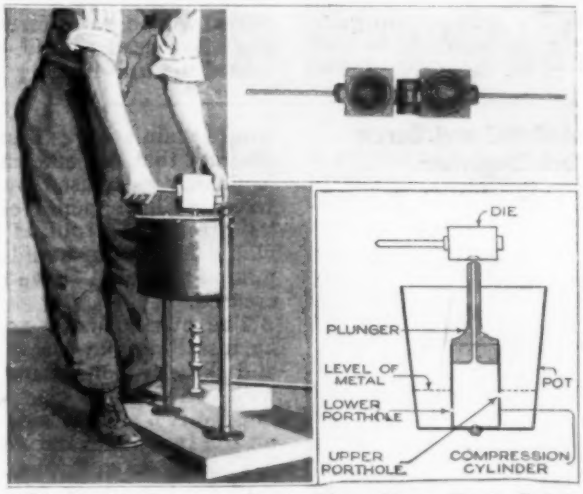
stand on this truck. The casters should turn readily in any direction. Good ones can be purchased at five cents each.

A Homemade Die-Casting Machine

By C. M. MAHOOD

ONE of the interesting processes which have been introduced recently in quantity-production factories is that of making quite accurate finished castings without machining, by the process known as die-casting. In this process, the melted metal is forced into dies under pressure, and after it has cooled, the dies are opened and the finished castings removed. It is thus possible to cast parts which have the "particular" dimensions accurate to the thousandth of an inch, or even less. The metals used are alloys of fairly low melting points, as it has not been found practicable to make dies which would stand up under the temperatures necessary for casting iron or steel.

While die-casting is more particularly a factory process, yet, for certain jobs, it is entirely possible to use to advantage some methods of die-casting in the small shop. Whenever a considerable number of small parts have to be made which do not have to be of great strength, but should be accurate, the method of casting the parts directly to the finished shape should at least be carefully considered.



A Die-Casting Apparatus for the Home Shop: To the Left is Shown the Method of Making the Castings. The Smaller Photograph Shows a Type of Die for Casting Disks, and the Sketch Shows the Construction of the Apparatus

The apparatus herewith illustrated, which is almost entirely homemade, enables anyone to apply, in a somewhat crude way, the die-casting process. An ordinary iron kettle forms the pot in which the metal is melted, while two pieces of ¾-in. iron pipe, with two caps and two floor flanges, form the uprights which support it. These are set up and given a coat of stovepipe enamel. If the metal used is one having a fairly high melting point, so that the pot becomes excessively hot, a sheet-iron jacket may be placed around it, extending to the floor and inclosing the gas burner, gasoline torch, or other means of heating.

To the bottom of the pot is riveted a steel cylinder, which has an inner surface quite accurately machined. An old automobile cylinder, if not too badly worn, will serve, and the plunger may be made from the automobile piston, or machined from a very simple iron casting. The plunger is suspended by a wire loop tapped into it just beside the stem, and a cord runs from this loop to a lever, at the other end of which is a spring for the purpose of counterbalancing the plunger and automatically raising it, so as to clear the upper porthole. This hole, or slot, is about 1½ in. wide and ¼ in. high, and forms the main entrance for the metal from the surrounding pot. The level of the metal should be kept just above this porthole. A small porthole, about ⅛ in. in diameter, is also made near the bottom of the cylinder. Up through the stem of the plunger runs a ¼-in. hole, and the top of the stem is turned off to fit any standard countersink, which will be used in countersinking the sprue hole in the dies.

The dies are made in any of several ways. If one wishes to go to the expense of getting a high-quality die for long service, it can be ordered from a commercial die sinker. For certain types of parts, the die can be made by pouring out two pieces of cast iron and fitting them with dowels and wooden handles, and finishing the die inside with plaster of Paris. Such a die is readily made and is useful for short, rough runs.

The operation of such an apparatus is as follows: Fill the pot with metal to a height slightly above the upper porthole, and heat the metal to 100° or 200° F. above its melting point, in order to offset cooling in the stem of the plunger. Heat the die with a blowpipe flame before making the first casting; after the run is started, the die will be sufficiently heated by the hot metal, and in the case of large parts may even have to be cooled somewhat between operations. Lubricate the

die with beeswax; then close it, place it on top of the stem, with the end of the stem in the sprue hole, and press down upon the handles of the die. The metal will be forced into the die by pressure sufficient to form it for fairly accurate work. Remove the die at once, and as soon as the metal has had time to cool, open the die, throw out the part and proceed to make the next one in the same way. For small, thin parts, the time required for solidifying the castings will be found almost negligible, and the parts can be made as fast as the die can be closed, opened, and pressed down on the stem of the plunger.

As the plunger comes down, it at first forces metal out through the upper porthole; when the lower end of this is reached, the metal is forced upward through the stem. To prevent too great a shock when the main porthole is suddenly closed, the ⅛-in. hole is drilled farther down, which has the effect of diminishing the suddenness of closing the main porthole. The slight amount of metal which will flow out through this lower porthole will not prevent the flow to the die, as the action must be rapid.

Metals for this process are of various composition. Tables of alloys, having various properties, can be found in mechanical handbooks; the cheaper metals are those having a lead base, and have very little strength, though they are entirely practical for some purposes. The metal known as stereotyper's metal, composed of lead, tin, and antimony, melts at about 550° F., and is a useful metal for this class of castings. Where a harder product is desired, alloys with a zinc base and from 10 to 30 per cent each of copper and tin may be used. Shrinkage also varies for these different metals; that of the alloy used should be carefully ascertained before making any accurate die.

Pumps of Centrifugal and Screw Type Work Together

Tests of a well showed that it would furnish a large amount of water, but that

The Screw Pump Raises the Water to the Surface, and the Centrifugal Pump Then Takes Hold and Throws it Up to the Storage Tank

a heavy lift would have to be overcome to get the water to the surface, when it would have to be lifted an additional 50 ft. into a large storage tank.

It was clear that for such a heavy head, a centrifugal pump would be best. On account of the limited suction capacity of such pumps, however, it was also evident that a deep and expensive pit would have had to be built.

On the other hand, one of the new type of screw pumps, made to fit the casing of the well and sunk below the suction limit, would plainly have been indicated but for the fact that the efficiency of such pumps is greatly decreased by a heavy head of water. The expense of the pit, with all its attendant troubles and annoyances, would have been avoided, but the cost of pumping would have been greatly increased.

The owner finally solved the difficulty by installing the screw pump in the well and directly connecting it at the surface with a horizontal centrifugal pump, placing the two side by side and running both off the two pulleys of his engine.

The outcome proved him right. The load on the screw pump is relieved, before the water reaches the surface, by the centrifugal pump, which lifts it from there on the additional 50 ft. into the tank, and the centrifugal pump does not have to exert its limit of suction to take in the water.—Henry Simon, Laguna Beach, California.

Staining Wood a Dark Color with Roofing Cement

When a dark-walnut flat finish is desired on woodwork, one may use the cement which is furnished with rolls of composition-roofing material. To use this cement for a stain, work it sparingly into the wood with a lintless cloth, or small varnish brush; if any surplus cement remains, take it off with the cloth. The results obtained with this novel staining material are declared to be very satisfactory.—H. K. Capps, Stahl, Mo.

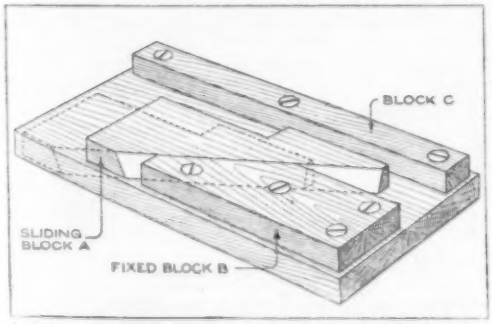
Groove Plane Made from Rip Saw

It will often be found on an old rip saw that the teeth near the handle remain quite sharp, although the teeth near the center of the saw are entirely worn out. If the saw is cut or broken off 8 or 10 in. from the handle, the short saw thus formed can readily be mounted with a few wooden blocks to form a groove plane. By giving the teeth a pronounced set, the groove cut may be made somewhat wider, if desirable.

A Bench Stop Which Clamps the Work

Ideas without number have been brought forth for bench stops and similar devices to hold work on the bench while planing or chiseling. All of them have their own virtues, but few have the property of clamping the work tightly when it is pushed into or against them.

A stop which has this property to an excellent degree and yet is simple of construction, is here illustrated. It consists of a sliding block, A, with one edge cut to a bevel, as shown; a fixed block, B, which also has one edge cut to a similar bevel, so that the edges of A fit against it and the straight block C. Blocks B and C can be fastened to the bench directly, or to a block on top of the bench. The notch opposite the bevel edge of block A is made of such size that it will take a certain range of jobs. Any number of blocks A can be made, each having a different shape and notch, and each taking a certain range of work. The work is inserted in the bench stop by simply laying the end of it in the notch in the block A and pushing it forward, so that the work is



A Simple but Efficient Bench Stop: As the Work is Pushed Forward into the Stop, the End of It is Firmly Clamped without Marring

wedged in between A and C. It is loosened by merely striking a blow on the small end of block A.—E. K. Wehry, Cedar Rapids, Ia.

Bench Snips or Shears

Very handy and cheap bench shears for cutting tin, or other sheet metal, which

A Handy Shearing Machine for the Bench is Made from a File and a Piece of Scrap Iron

is too heavy for the hand snips, can be made for the home-shop workbench, as indicated in the drawing.

A 14-in. flat file, with one side ground smooth, and a portion of the tip and one edge sharpened, makes the movable shear knife. The fixed cutter can be forged from a part of an old plowshare, or other suitable scrap steel. The bolt hole in the file is punched while the file is at a cherry-red heat. A locknut must be used on the bolt, or else the end must be riveted.—Chas. H. Willey, Concord, N. H.

Drilling Holes through Heavy Metal with a Bit Brace

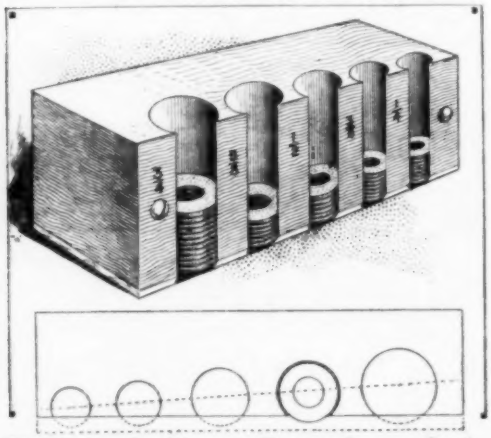
When holes of a diameter greater than about ¼ in. must be drilled through iron of considerable thickness with a bit brace, the big part of the job is to maintain the proper pressure on the drill. It will be much easier if a small hole is first drilled by means of a hand drill, of, say, ⅛ in. diameter, the hole being reamed to size with the large drill in the brace, which will then require much less pressure than without the small hole.—Chas. A. Black, Jr., Hightstown, N. J.

Universal Lathe Chuck Used as a Vise

A universal chuck mounted face upward on a heavy wooden block is a useful type of vise for many purposes in the shop. Any job that would be held in the chuck for lathe work can be held similarly in this vise, and is then ready for any handwork, such as laying out, filing, or scraping.—H. S. Hart, Shreveport, La.

A Rack for Washers

Workmen who have frequent use for plain washers of various sizes, and who



The Washers Are Always in Sight, and cannot Rattle Loose. The Rack is Easily Filled, and One or More Washers are Easily Removed with the Fingers

like to keep them handy so that they can be picked up and put into place as quickly as possible, may find it convenient to make a rack like the one shown in the sketch. It is made from a single block of wood, by boring holes slightly larger than the respective diameters of the washer to be used. The line on which the center for these holes is laid out should be slightly out of parallel with the edge of the block, and should be located so that the largest hole to be made will not meet either edge of the block. Then, after all the holes are drilled and a piece of cigar-box, or other thin, wood is attached to form a bottom, plane off the block, so as to expose the holes from the side. The washers can be stacked in the rack by simply dumping them in and shaking the rack about.

Enlarging Pistons by Peening to Eliminate Slap

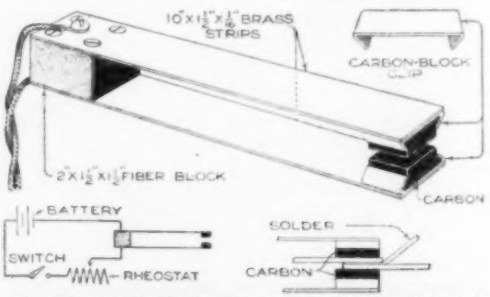
When an automobile piston is found to be "slapping," due to the skirt being too small, one way to remedy the trouble is to remove the piston from the connecting rod, lay it upon its side on an anvil, and strike a succession of blows with a ball-peen hammer on the inside of the skirt. The blows should be light and very even, and uniformly distributed. The piston should be accurately calipered to see that the enlargement is proceeding properly and that the peening is not bending the skirt slightly out of round. A piston thus treated, fitted with good-quality piston rings, will often give satisfactory service where oversize pistons would otherwise have to be fitted.

Electric-Soldering Tongs

Simple soldering jobs, such as splicing wires, fastening cable leads to terminal clips, or sweating metal plates together, may be quickly and neatly done with electric-soldering tongs. The parts to be soldered are brought almost instantly to the correct heat, which is not possible with the ordinary soldering copper.

Two spring-brass strips, 10 in. long, 1½ in. wide, and at least 1/16 in. thick, are used to carry the electric current to the carbon electrodes as well as to form the tong handles. Form two brass clips of such dimensions that they will each hold a piece of carbon, 1 by 1 in., by ½ in. thick. Rivet them to the end of the brass strips; a good job of riveting must be done, and the clips must seat snugly against the strips so that a good electrical connection is assured. Saw a block of fiber 1½ by 2 in., by 1½ in. thick. Drill small holes in the free ends of the strips so that the latter may be screwed to the fiber block, parallel and insulated from each other. Provide electric wire connections to the brass strips.

The tongs must be operated from a low-voltage circuit, and for most shops the storage battery will best meet this requirement. For temperature regulation during soldering, a variable resistance or rheostat should be used to decrease or increase the flow of current. To solder, it is only necessary to grasp the piece or pieces to be worked on between the carbon electrodes by using the device like a pair of tongs. The instant an electric circuit is established between the carbons the latter



The Electric-Soldering Tongs Operate on a Principle Similar to That of Electric Welding, the Heat being Due to Passage of Heavy Current through the Work

should come to a red heat, and soldering is the work of but a few moments.

If desired, the brass strips may be

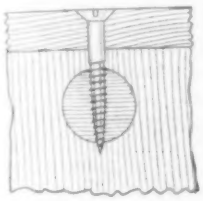
wrapped with friction tape for convenience and safety in laying the tongs down; it is not necessary for protecting the hands, if the rheostat is wound noninductively.—Kenneth Coggeshall, Webster Groves, Mo.

Soldering Paste Carried on Torch

A handy way to carry soldering paste, when working on poles or ladders, is to solder a piece of 1½-in. square brass tubing, about 3 in. long, with a bottom soldered in it, to the side of the blowtorch. Fill it with paste, and it will always be handy when wanted.—E. C. Galbreath, Denver, Colo.

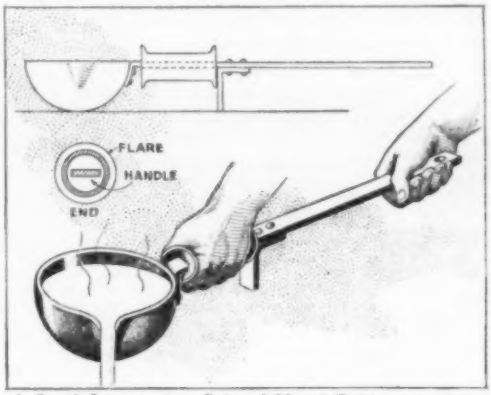
Making Wood Screws Hold When Parallel to Grain

Wood screws inserted into the end of the grain, especially of soft wood, do not take a very strong hold. The hold may be improved by backing out the screw after it is inserted, placing a small amount of glue in the hole and then reinserting the screw. When screws are to be taken out repeatedly and reinserted into the end of the grain, as is often necessary where work is required to be taken apart in the foundry, simply screwing them into the end of the grain should not be depended upon. In such cases, insert at right angles a hardwood plug, as shown, and allow the screw to pass through it. When the screw will no longer hold in consequence of its repeated withdrawals, the worn-out plug may be taken out and a new plug inserted.—Ernest Schwartz, Brooklyn, New York.



Improving an Old Ladle

Small ladles for pouring babbitt or lead can often be improved as shown in the sketch. A piece of tubing, about 5 in. long and flared out at both ends, is slipped over the handle. A piece of steel, bent to a right angle, is then riveted onto the handle, back of the tube, serving the double purpose of holding the tube on and of forming a leg so that the ladle can be set down, if required, without tipping over. In order to serve its purpose well as a leg, this piece of steel should be at least 1 or 2 in. wide. By gripping the tube handle with the left hand and tilting the ladle by gripping the end of the long handle, with the right hand, the metal

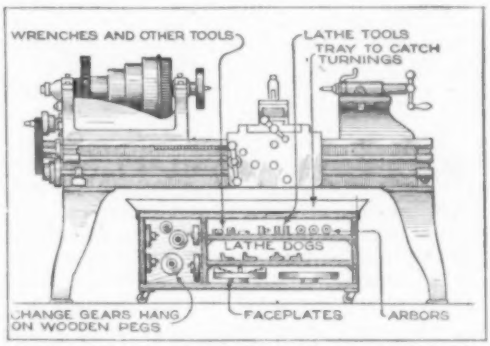


A Steel Leg, and a Grip of Metal Tubing over the Handle, Make the Old Ladle More Convenient in Use

can be poured quite readily. Hold a piece of folded cloth, or soft asbestos, under the left hand around the grip, so as to protect the hand from the hot metal surface.

Neat Chest under Lathe Holds Tools and Gears

The chuck and faceplates of a lathe in many shops will be found either on the floor or hanging somewhere about the legs of the lathe. The drawing suggests a means of keeping the chuck, faceplates, dogs, and gears neatly where they can always be found, and of having the drip pan in a proper position at the same time. The tray may be removed from the box



A Chest Placed under the Lathe Carries the Drip Pan on Top, and Has Shelves and Hooks for the Lathe Tools and Accessories

to dump out the oil and chips from the lathe, and the entire box can be rolled out on its casters when sweeping the floor.

Vessel for Cooking Potatoes for Hogs on the Farm

It is not necessary to feed raw cull potatoes to hogs just because there is no

A Large Cooking Pan for Use on the Farm may Consist Partly of Wood. It is Used in Such a Way That the Wood is Protected from the Fire

cooker on the farm. One 16-ft. plank and a sheet of galvanized iron, together with a few nails, will make a good, serviceable cooking pan that will last all winter if it is used carefully.

The plank should be 2 by 12 in., and long enough to be cut in two pieces, 7 ft. 6 in. long. The two pieces are rounded at both ends, sled-runner fashion, and made square and smooth on the edges with the plane and drawshave.

The galvanized iron should be No. 24 gauge, or thicker. It should be 3 ft. wide and 8 ft. long. It is thoroughly nailed to the edges of the planks with eight-penny wire nails. The cooker is finished at the ends by crosspieces of wood to protect the edges of the galvanized iron and stiffen the frame.

To use the cooker, it should be placed on two ridges of clay, made level and plastic with water so the cooker fits down tight all along both sides. The fire is made near the windward end, so the draft will carry the heat under the whole length of the cooker to get the full benefit of the fuel.

There should be enough water in the cooker to boil the potatoes soft without burning. Just before the cooking is finished, let the fire die down, and dip all surplus water out so the mass of potatoes will steam dry, just as in cooking potatoes for household use.

This heating pan may also be used to heat water for scalding pigs at killing time.

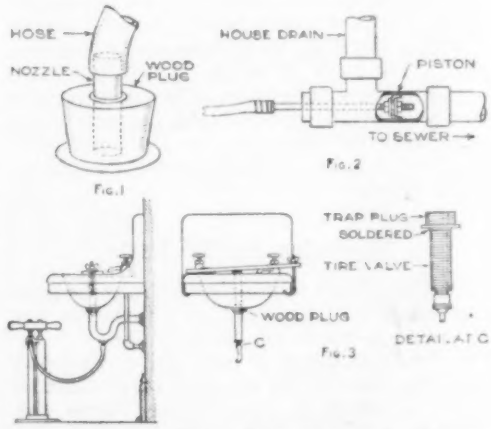
¶ Rubber cement is good for patching clothing. Use according to directions given for rubber; pressure with a hot iron will vulcanize the job if desired.

Cleaning Out Clogged Drains with Fluid Pressure

In many cases the handiest way to clean out drain pipes which have become clogged with dirt, is by means of water or air pressure. It is, of course, quite common to use the nozzle of a hose, thrusting it down through the drain and turning on the water under high pressure, this method being used often in cleaning out sewer outlets in city streets. The objection to such procedure is that the water backs up into the sink or washbowl. This can be prevented by making a taper plug of wood, as shown in Fig. 1, which can be fastened on the hose nozzle and thrust into the drain inlet so as to prevent the possibility of the water backing up.

Another way to prevent the backing up of water, which is useful in places where the above method would not be practicable, is to make, on the end of a piece of ¾-in. pipe, a piston of proper size, as in Fig. 2, to be pushed into a large drain pipe which has become clogged. To the other end of the piece of pipe the hose is attached, and water is then forced in without danger of backing up.

Where water pressure is not available, it is possible to use air pressure as furnished by an automobile-tire pump, as shown and detailed in Fig. 3. One way to do this is to unscrew the plug at the bottom of the water trap below the washbowl, and solder into this plug an automobile or bicycle-tire valve. Then, if the



One of These Devices for Forcing Fluid Pressure into Stopped-Up Drain Pipes may Often Save Much Time and Expense

bowl outlet is tightly plugged, air can be forced in at a pressure high enough to dislodge the dirt which causes the congestion.

A Disappearing Stairway

By L. B. ROBBINS

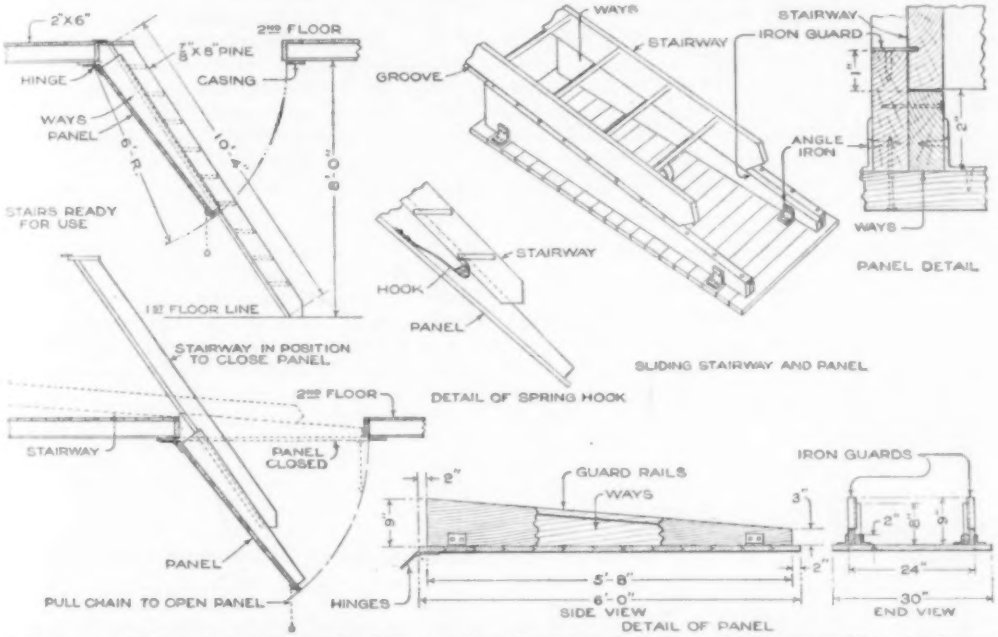
A STAIRWAY which can be quickly and easily disposed of so as to give needed floor space in the bungalow, or small cottage, is a thing generally much desired. Such stairs are not at all difficult to construct.

As will be seen in the sketches at the left, the stairs are hung in an opening, or well. This should be cut 6 ft. long, between two adjacent rafters. It is then boarded in on the sides and ends, the boards coming flush with the ceiling of the room. A casing of 6-in. boards should be laid around the edge of the well, so that the edges of these boards will just meet the edges of those inside the well.

The swinging panel is constructed in such a way as to make a presentable appearance to the occupants of the room when it is swung up in place. It is 6 ft. long and 2 ft. 6 in. wide, supposing the rafters to be 30 in. apart. If the ceiling timbers are spaced any other distance between centers, make the panel of a width to correspond, so it will lap over the edge of the sides of the opening about 1 in. When the well is ready for the panel it should measure 5 ft. 10 in. by 2 ft. 4 in.; the panel then sets into, and flush with, the casing.

The upper face of the panel is provided with inclined ways, as illustrated to the right. Cut two boards to the shape shown for the guard rails, of ⅞-in. stock, 9 in. high at one end, and 3 in. high at the other. Then make another pair for the ways, 8 in. high at one end and 2 in. at the other. Match each pair and screw them solidly to each other, the ways inside of the guard rails. Along the top edge of the latter, screw strips of band iron, 1½ in. wide. See that this iron has straight and parallel edges, and that the outside edges are flush with the guard rails. The ends of these boards should come at least 2 in. from each end of the panel. Fasten the guard rails to the panel with angle irons. Hinge the panel at the heavy end to the casing of the well with solid hinges, and provide the free end with a chain by which it can be pulled down to put the stairs in service.

The stairs illustrated are for a room 8 ft. high; the length can be easily varied to suit the height of any room more or less than 8 ft. Cut the sides from two 8-in. pine boards of ⅞-in. stock. The longest edge, as indicated, should be 10 ft. 4 in. long to obtain a good angle for such a stairway. The bevel at the lower end is 6 in. wide, and the top bevel can be cut parallel with the upper floor by setting



A Stairway Which is Lifted Out of the Way in a Few Seconds: It Is Only Necessary to Slide the Stairs Upward on the Ways Until They Catch on the Spring Hook, and Let the Panel Rise Flush with the Ceiling. A Corresponding Operation Brings the Stairway Down, Ready for Use

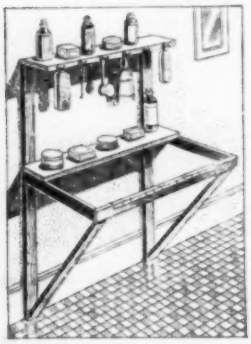
the sides in place temporarily and marking with a straightedge. The width of the steps should be such that the sides will fit fairly snugly down on to the ways, yet not so tight as to bind in the least. Then a groove should be cut along the outside of the sides, into which will slide the edge of the iron straps, or guards. These prevent the stairs from being pulled away from the ways. Set in the treads, parallel with the floor, and the same distance apart all the way up. It is well to mortise them into the sides about ¼ in. to stiffen the structure. Angle irons at the top and bottom steps will further prevent it from pulling out of shape. A little paraffin on the ways will improve the sliding qualities.

The stairway disappears by sliding it up the ways until the bottom is some distance above the lower end of the panel. Somewhat more than half of the stairway should project into the air and should be slightly more than sufficient to counterbalance the weight of the panel and bottom of the steps. To fasten the stairway when it is pushed to the proper height, and keep it from falling, a spring hook is provided, as shown in the detail. It works automatically when the stairway is being put away, but must be released by hand when the stairs are being lowered for use. When they are fastened by this hook, the panel tends to rise, being pulled upward by the weight of the upper end of the stairs. By means of the chain, which should have some sort of knob at its end, the panel is held as it moves into place. No catch or fastening is necessary to hold it there, as the counterbalancing weight of the stairs accomplishes this purpose.

Being a stairway which is as easy to ascend as an ordinary one, and yet taking up no more space than the trapdoor and ladder so frequently found, the construction may be very useful for reaching almost any upper story if access is not necessary in the daytime, but only at night for sleeping purposes.

Shoe Shining at Home Made Easy by Handy Outfit

One of the needless luxuries for which Americans spend enormous sums of money is that of having their shoes shined at a public shoe-shining parlor. It is well to remember that shining one's own shoes means no loss of time, but rather a saving of time, as there is no waiting and no delay if everything is handy. A rack, such as illustrated, makes this surprisingly easy. Either foot is placed on the outer rail and all brushes and material are then within handy reach. The posture can be shifted as found convenient, to give access to the rack, and clearance for the polishing cloth.

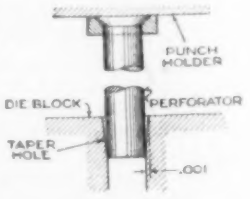


Improvised Electromagnet Picks Wrench from Crankcase

A wrench which had been accidentally dropped into the transmission case of a car, seemed to be almost impossible to recover without tearing down part of the transmission. It was recovered quite easily in this way: A ½-in. bolt, 15 in. long, was wound with about 15 ft. of insulated copper wire, and four dry cells, in multiple, were connected to this coil. At the cost of a few seconds of ruinous service on the cells, an electromagnet was formed, so powerful that it lifted the wrench from the transmission case and saved a big job of tearing down and reassembling.—John H. Thies, Cedar Falls, Iowa.

Keeping Small Punchings from Sticking to the Perforator

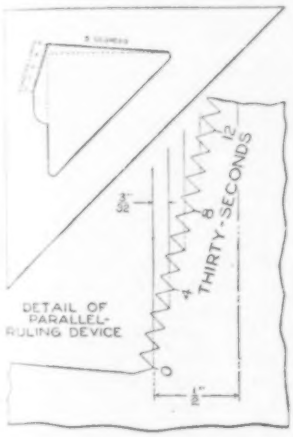
In perforating, on the punch press, holes in very thin stock or of very small diameter, one important source of trouble is that the punchings have a tendency to stick to the end of the perforator, and be carried along the stock to the next hole to be punched, where they do much damage. The trouble can be obviated by the use of the compound type of punch and die, but these are expensive. A cheaper method is to ream out the hole in the die to a slight taper at the top, so that it is about .002 in. oversize at the cutting edge. The perforator is made just long enough



to reach down beyond the end of the taper. The punching will then be wedged tightly in the die hole, and will not adhere to the perforator. There will, of course, be a slight burr turned up around the punched hole, but this will be removed in the tumbling operation commonly performed on this class of parts.—S. B. Royal, Reading, Pa.

Useful Kinks for Improving the Draftsman's Triangle

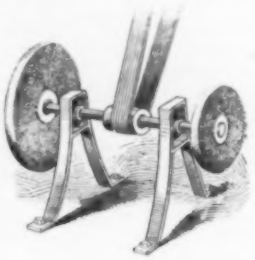
The ingenious draftsman can make on his triangle many little improvements which will facilitate his particular line of work. Two such kinks are shown in the illustration. Each shop usually has its own rule as to draft angles in castings, these being usually from 5 to 10°. One of the inside edges of the triangle may be dressed off with a knife, chisel or file to this angle; and by turning the triangle to a suitable position, one can then readily draw these lines with the proper slant.



Another useful kink is to dress off another of the interior edges to a somewhat steeper angle, and file notches of uniform depth at equal intervals along the edge. These are quite useful in section-lining and in drawing lines for lettering, as the lines are easily spaced the same distance apart. In determining the position of the notches, the triangle should be placed over two lines, which are drawn ¼ or ½ in. apart, and the part of the slanted edge which comes between the two lines should then be divided into 8, 16, 25 or 50 equal spaces, as preferred. If notches of equal depth are made at these points, then, by setting the pencil in the notches and sliding the triangle along, lines can be readily drawn at a distance from each other of any desired number of thirty-seconds or hundredths. Figures can be scratched onto the triangle, making an enlarged scale along this edge of the triangle.

Shafting Hangers Converted into Neat Bench Buffer

Many shops where the position of overhead shafting has been changed, can find use for a pair of shaft hangers, which may have been left over, to fit up a bench buffer. A short piece of shafting is mounted, as illustrated, with collars and setscrews to keep it in place lengthwise, and buffing or polishing wheels are mounted on the two ends. It is not desirable to run a heavy emery wheel at high speed on ordinary shaft hangers, as they are not built for such service, but for buffing and polishing of various kinds the arrangement does very well. The cost of construction is practically nothing, as no material need be purchased.—Ernest Schwartz, Brooklyn, N. Y.

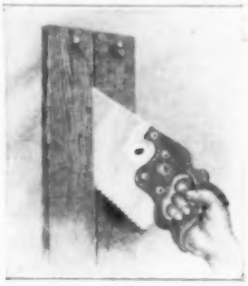


Boiling Potatoes to Loosen Boiler Scale

A 40-hp. steam boiler was kept clear of scale for over 20 years by the simple process of placing in it at intervals a bushel of potatoes. It was found that after these were boiled for a time, the scale loosened and collected in the bottom of the boiler, where it could be easily removed.—T. J. Hubbard, Mendota, Ill.

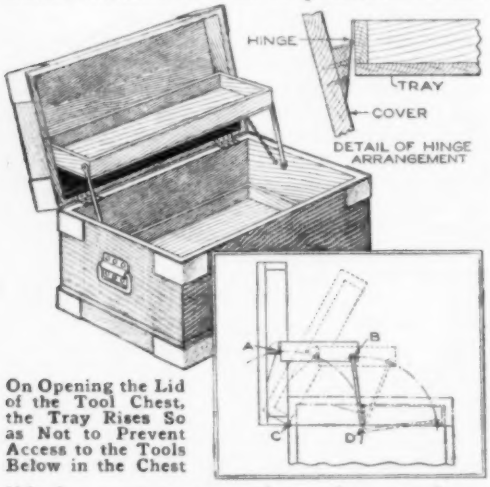
Sawing through Plaster Walls

When cutting an opening for a doorway through a plastered wall, the usual result is a number of cracks in the plaster, some of them projecting beyond the part to be covered by the door casing. Owing to the hair used in the plaster to make it stick together, the saw mutilates it badly, sometimes tearing out large pieces. This can be diminished by nailing two stiff boards to the plaster, with room between them for the saw, and working the saw between these two boards.—W. H. Sargent, Rutland, Vt.



Tool-Chest Tray Rises When Lid is Opened

A tray built in the lid of a tool chest, which remains level at all positions of the



On Opening the Lid of the Tool Chest, the Tray Rises So as Not to Prevent Access to the Tools Below in the Chest

lid, is a very convenient place to keep small tools or articles which are used quite frequently. The tray should not be much wider than half the width of the chest, or it will be more difficult to get at the tools in the main part of the chest.

In order that the tray remain level, the four hinge points, A, B, C, and D, must form a parallelogram; that is, the distance AB must be equal to CD, and AC to BD. Since D must be below C, in order to give the screw at D a firm hold in the side of the chest, B must be set the same distance below the level of A; and because D can be only a short distance below the level of the edge of the chest, the links which support the tray should not be used to keep the lid from falling back; a chain or separate sliding link should be used for this purpose.

Readers who are interested in geometrical puzzles may find it interesting to figure out the conditions under which A and B could be placed in the same horizontal plane, with D lower than C, and still have the tray level in both open and closed positions.—Eino E. Lakso, Fitchburg, Mass.

Pocket Mirror Is Useful in the Shop

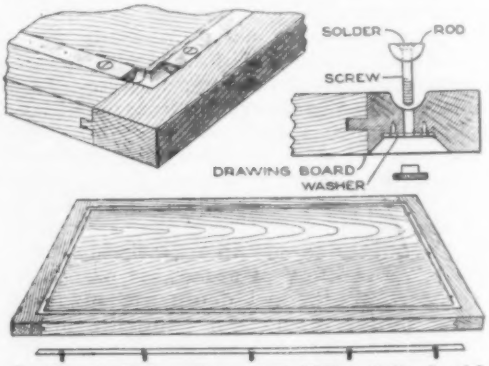
A small pocket mirror is a very handy thing in the shop. Either daylight or artificial light is thus easily reflected into a dark corner or into a blind hole. When the lamp attached to a lathe or other machine cannot be adjusted to a proper place for seeing the work, the mirror may often help out. Similarly, if a deep flask in the foundry is to be examined, a mirror is much handier than a torch.—Edwin J. Bachman, Fullerton, Pa.

Fastening Drawing Paper Tightly to the Board

When a sheet of heavy drawing paper must be held very tightly to the drawing board, a common method is to wet it thoroughly and paste the edges to the board. Then, when the paper dries, it will contract slightly and will be stretched very tightly on the board. This tension is so great, however, that unless the paste holds very firmly, the paper will be torn away from the board, and the process must be repeated.

The sketch shows a board arranged with the idea of avoiding this trouble. Four bars of half-round iron are laid into grooves, cut to fit them, around the edge of the drawing board. The sheet of drawing paper should be large enough to project an inch, or more, in all directions beyond these grooves. The corners of the sheet are then cut off diagonally, and the four edges of the sheet are forced into the grooves under pressure of the half-round bars. The bars are held down by screws, soldered into them at intervals of a few inches, which project through holes made in the board. On the lower ends are fitted brass thumb nuts, such as are used extensively in electrical work.

With this arrangement, the paper can be clamped very tightly even without wetting it; there is no reason, however, why the paper may not be wetted and then



By Means of Four Bars of Half-Round Steel, with Machine Screws Soldered In, the Drawing Paper is Clamped Very Firmly to the Board in a Few Seconds

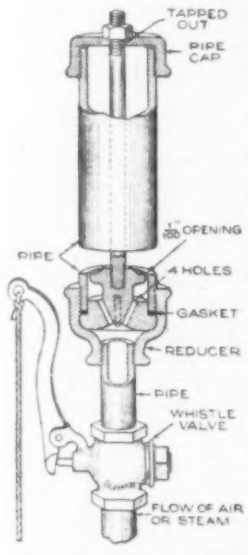
clamped with the rods, if this is found to give better results with the particular quality of paper used.

Used Oil from Auto Engines Makes Good Fuel

When the lubricating oil in the automobile engine is changed, the old oil, although it has lost its usefulness as a lubricant, still makes an excellent fuel. A good way to utilize it is by soaking it up into paper or shavings, and pressing these, if possible, into compact shapes. Care must be taken to guard against spontaneous combustion, and to protect the oil-soaked material in every way possible from fire danger.—Parke L. Shee, Oak Park, Ill.

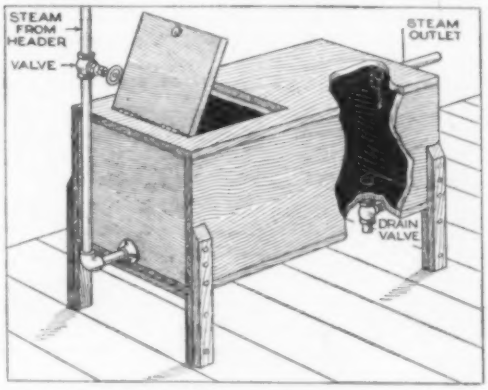
Steam Whistle Made from Pipe Fittings

A small shop, which does not require the daily use of a steam whistle, may nevertheless desire it greatly on special occasions, such as for celebration purposes. Even though steam pressure may not be available, compressed air, as maintained for inflating tires, is equally useful. A whistle can be made almost entirely from pipe fittings and scraps of iron. Only one part need be turned in the lathe, namely, the irregular part contained within the reducing coupling. It should be turned to allow an opening of not much more than .01 in. between it and the short piece of pipe by which it is surrounded. The tone of the whistle depends on the length of the upper pipe, and 3 or 4 in. will be found a useful length. The whistle valve may be purchased, or, for occasional use, some other form of valve may take its place.—Charles Springer, Detroit, Mich.



Mechanic's Clothes Laundered by Exhaust Steam

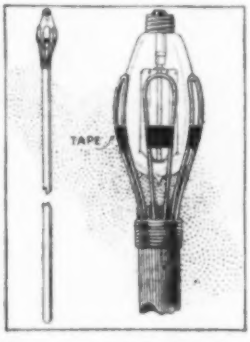
In a shop where exhaust steam was plentiful, a mechanic built a box, with a lid for closing it tightly, connected to a pipe which led through a valve to the exhaust-steam line. Soiled overalls or shop clothes are thrown into the box, and the steam is turned on. A small pipe was provided as a steam outlet, and another to carry off the condensed steam from the bottom. It was found that, after remaining in the box for a few minutes, the overalls were quite well cleaned. After removal from the box, they were rinsed in cold water, and the box was ready for the next batch.—Roy H. Poston, St. Francois, Mo.



A Mechanic Built His Own Steam Laundry for Cleaning His Overalls, Making Use of the Exhaust Steam from the Shop Engines

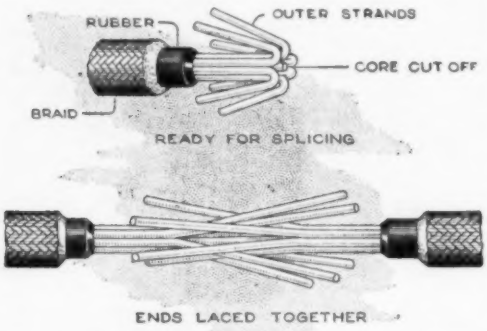
Replacing Incandescent Lamps in Lofty Ceiling Fixtures

A useful tool, for removing blown-out electric lamps from high ceiling fixtures and replacing them with new ones, was made from a long pole with wire loops firmly attached to the end. The loops of spring wire were so shaped as to slip over the end of a lamp of the size used and hold it firmly. Each loop was wrapped, at the point where the lamp diameter was largest, with insulating tape, which created friction between the tool and the glass, so that the lamps could be loosened even if screwed in quite tightly. A tool of this character can readily be made jointed, to reach fixtures of various heights, and will save a great deal of the time otherwise spent in bringing ladders and climbing upon them to reach the lamps.—Dale R. Van Horn, North Loup, Neb.



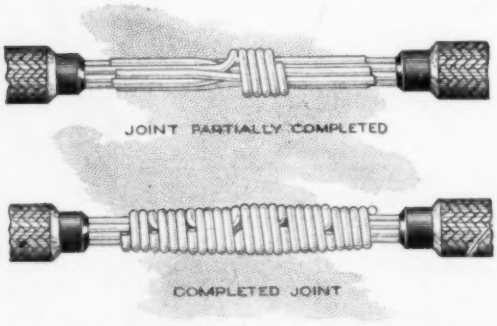
Splicing Stranded Wire

Almost any practical man can make a splice, between the ends of two stranded electric conductors, which will carry the



The Strands are First Bent Back, So That the Core may be Cut Off, and Are Then Interlaced

current, but comparatively few know how to make quickly a strong splice which will have a neat, businesslike appearance. The successive steps of the process are shown in the sketches. The first step is to "skin" the wire, and sandpaper it until it is bright, removing all the rubber and other insulation from the conductor. Next the ends of the outer strands should be bent back to expose the core, which should then be cut off. The outer strands are now forced back almost to their normal position. The two ends to be connected are laced together, so that the end of each strand comes between two ends from the other conductor. Proceeding, each one of the free ends is wrapped around the main conductor, taking all strands of each conductor in their order, going around the joint, and



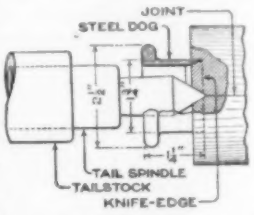
The Strands are Wound Around, One after the Other, Forming a Joint of Great Strength

wrapping each one around as many times as it will go. Each strand should be cut off where it meets the next strand to be wrapped, as indicated in the lower sketch, so that there will be no incomplete turns of wire.

To solder the joint, the molten metal should be poured with a ladle, so that it will drain into the solder pot through and around the joint, until the joint becomes hot enough so that the solder will permeate it and stick to it effectively. After the joint has thus been uniformly heated, and appears to be "tinned" over its whole surface, a wet piece of waste can be held on it to cool it quickly. Tape servings around the joint, to the thickness of the insulation of the original wire, complete the splice.—E. D. Hunt, St. Louis, Mo.

Holding Split Patterns in the Lathe

When a pattern maker wishes to do a quick job of turning up either one or both halves of a split pattern, he often makes use of small "pinch dogs," which are driven into the pieces to hold them together. These dogs are not always very satisfactory, and are dangerous, as they may fly out at high speed. One pattern maker uses circular dogs of the type illustrated on both live and dead centers of the lathe. One of the dogs is driven into each end of the wood; the one at the dead-center end revolves on the dead center, while the other revolves with the live center. The flange around the dog aids in withdrawing it after the work is completed. It is well to caseharden the sharp edge.

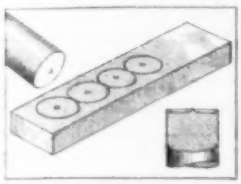


To Dry a Lens Properly

Surveyors often find their instrument lenses fogged in cold weather, due to moisture condensing upon the cold crystals. It should not be wiped off, as this in time injures the polished surfaces, but should be evaporated by gently warming the lens. Especially is this necessary when the inner surfaces become fogged; they will soon clear if the instrument is set in a warm room. This is seldom practicable, however, but if the objective end of the tube is grasped in the bare hand, in a few minutes the lenses will be dry and clear. Never put any lens near a stove to dry, as even a moderate temperature may injure the cemented joint and ruin the lens.

Punch for Laying Out Drill Holes

When laying out a row of holes for cutting out a piece of metal, as in die work, it often requires a great deal of practice to be able to space the holes accurately. A special punch which makes this work much easier can be made from a piece of drill rod the size of the drill to be used. Shape the end, as shown in the illustration; then harden and temper the piece for use as a punch. The manner of using it is evident from the illustration; the small center marks can be deepened with an ordinary center punch before drilling, if found convenient. —J. H. Beebee, Rochester, N. Y.



THE THOUSANDTH OF AN INCH

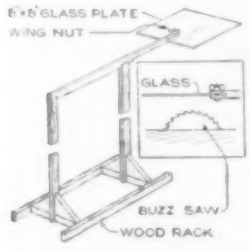
By Thos. A. McMahon

At night I sit and ponder
On the thousandth of an inch;
I knit my brow, and scratch my head,
And then my fists I clinch.
O show to me the man, sez I—
If Irish, Dutch, or Frinch—
The man who first invented
The thousandth of an inch!

When finally I crawl in bed,
So thankful for a snooze,
I drive my sorrows all away
Without the aid of booze—
I dream that they have caught the man,
And him they now will lynch,
By jinks! The man who did invent
The thousandth of an inch!

Glass Plate over Buzz Saw Protects Eyes

When a buzz saw begins to get dull, it usually throws sawdust quite badly into the face of the operator. One user of a buzz saw found it convenient to have handy a pane of glass mounted on a frame, as illustrated, so that the glass could be placed directly over the saw, to shield the operator's face. The utmost care must, of course, be taken to make the frame solid and steady, so as to prevent the glass from coming into contact with the saw.—Frederic Doremus, Passaic, N. J.

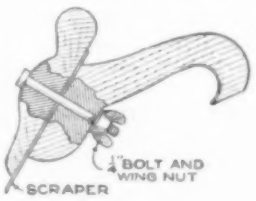


Homemade Concrete Tombstone

The photograph shows the splendid results obtained in making a tombstone of concrete with no special equipment. A mold was made out of ⅞-in. lumber, in four parts, for the four sections of the tombstone. The letters were cut from cardboard, and fastened to the side of the mold, reading in reverse so that they would be in the correct order on the stone. The concrete was mixed, using one part cement and three of sand, and was poured in from the top. It takes about three weeks for such a stone to dry, but if well made, it is scarcely less durable than a marble stone, and makes an appearance which is not at all unpleasing.—James F. Welliner, Danville, Pa.

A Handle for Scraper Blades

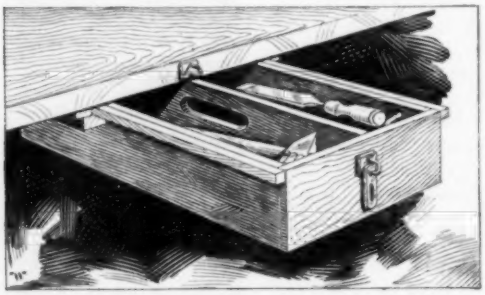
Scrapers for wood are widely used without handles, the blade being held directly in the hands. While this is hard on the fingers, especially of an inexperienced man, it is necessary, chiefly in order to get into corners where a handle would be in the way, or would interfere with holding the scraper at the proper angle. A carpenter, who uses on his scrapers the handle here illustrated, finds that it gives very little trouble in this respect, and saves soreness of the fingers when there is much of this kind of work to do. The handle is cut from hard wood, ⅞ in. thick, and the backing block is rounded off smooth at the top to allow a firm hold by the left hand, giving plenty of pressure against the work.—Benj. W. Bush, Keyport, N. J.



¶All bearing surfaces in machinery should be as large as is practicable, insuring against undue wear. Compensation for wear should also be provided for.

A Portable Tool Drawer

A carpenter who works in a plant where he has to carry his tools around frequently to various locations in the shop, fitted



Transfer of Tools from the Drawer to a Portable Tray is Avoided by Combining the Two Receptacles into One, Which Serves the Purpose of Both

up a box which serves either as a drawer for his workbench or for a tray to be carried. When in its place under the bench, the drawer is readily locked with a padlock over the hasp shown. When the carpenter starts out to work in another part of the plant, he merely takes out the drawer, catches it by the handle in the middle partition and carries it with him.—Chas. H. Willey, Concord, N. H.

Proper Placing of Three Hinges on a Door

When three hinges are used on a barn or garage door, they are usually placed equidistant; the third hinge, being midway between the other two, is then of little use except in restraining any tendency of the door to warp. It does very little good toward supporting the weight of the door, and on doors where warping is not to be feared, it will make a better job if the third hinge is placed directly underneath the upper hinge, as this is where its strength will count the most. The appearance may not be quite so symmetrical, but the door will work longer without attention.

Lead "German Soldiers" Used as Targets

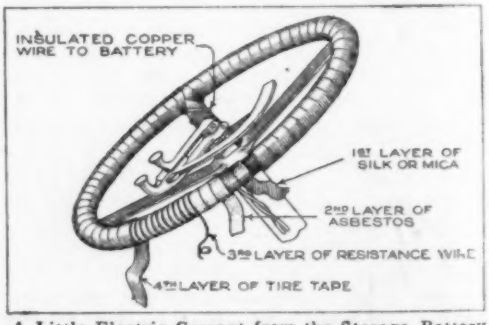
The enterprising owner of a public shooting gallery set up for targets, instead of the ordinary figures of birds or fowl, a line of small German soldiers made of lead. Every successful shot broke up one of these soldiers, but the pieces of lead were caught up in a net and were readily recast.—Philip A. Wall, Bedford, Mass.

Saving Fuel on the Gas Range

A kink which will save gas in the kitchen is the use of a large piece of sheet iron, to be placed directly on top of the stove when there are several utensils to be kept warm. The sheet-iron plate conducts the heat from one burner and distributes it to the others so that only the one burner need be kept lighted. The sheet-iron slide which many stoves have under the burners to catch dirt, if easily removed, will be quite satisfactory for this purpose. No great amount of heat will be conducted to the vessels indirectly over the fire, but there will be sufficient to keep the contents warm enough for eating.—G. A. Luers, Washington, D. C.

Electric Hand Warmer for Automobile Steering Wheel

One of the simplest electrical conveniences to make for the automobile is an electric hand warmer. On the half of the steering wheel that comes toward the driver's body, or where he will grasp the wheel, wind a layer of heavy silk cloth. Mica will do just as well, and if one is sure the wheel will never become wet, no silk layer is necessary. Next, cut some asbestos in strips, and wind it over the silk. Then wind some resistance wire carefully upon the asbestos, with each turn ¼ in. from the next, being careful that no two turns touch. Over this wind tire tape, extending it also over the other half of the wheel, for the sake of uniform appearance. To the ends of the resistance wire connect insulated, stranded copper wires, that reach down the steering post to a connection with the storage battery


INSULATED COPPER WIRE TO BATTERY
1st LAYER OF SILK OR MICA
2nd LAYER OF ASBESTOS
3rd LAYER OF RESISTANCE WIRE
4th LAYER OF TIRE TAPE

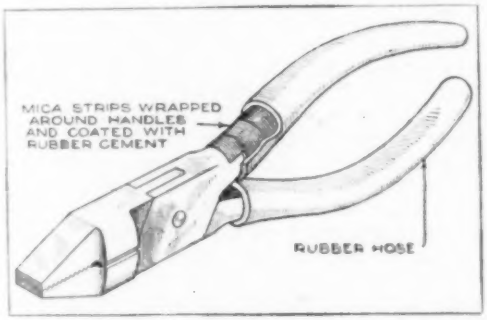
A Little Electric Current from the Storage Battery on the Car, Passing through Resistance Wire Wound on the Steering Wheel, Keeps the Driver's Hands Warm on the Coldest Days

of the car. Place a switch in the line so that the circuit can be broken. A good enough resistance material for this purpose is bare iron wire. For six-volt bat-

teries, 30 ft. of No. 20 gauge iron wire will do; for 12 volts, about No. 23 should be used. The wire should become only moderately hot; this can be determined in each particular case before the tire tape is permanently wound in place.—F. E. Brimmer, Dalton, N. Y.

Insulating Handles for Pliers and Other Tools

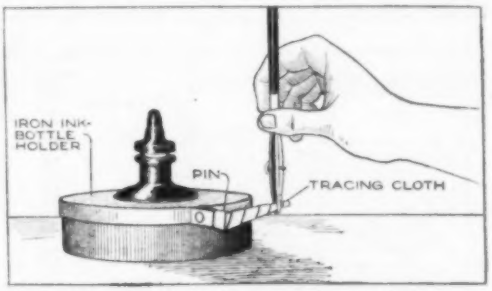
In order that the electrician may work with safety on wires carrying high voltage, the handles of his pliers, and other tools, are often insulated with tape or wood. These materials do not form a satisfactory insulation against any considerable voltage, except when dry and in good condition. Those who wish a better quality of insulation may use this method: Give the handle a coat of shellac, and wind around it strips of mica; over this give a coat of rubber cement, such as is used for repairing automobile tires. Before the cement gets too hard, slip over it a piece of red-rubber tubing (not fabric hose) with walls about ⅛ in. thick. When the cement has hardened, it will hold the rubber tubing firmly in place. One reason for selecting red-rubber tubing rather than white is that it makes the tool much easier to distinguish on a bench, which may be full of other tools and white-porcelain articles. The outer ends of the pieces of rubber tubing should be vulcanized together, or stitched with stout thread, in order to protect the hands.



Rubber Tubing Cemented on the Handles of the Pliers, with a Layer of Mica Between, Gives a Real Insulating Handle

Pen Wiper for Draftsmen

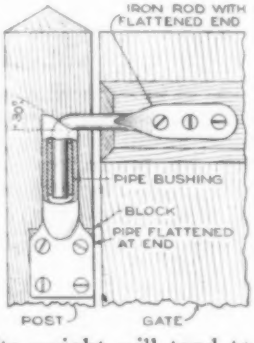
Much time can be saved in the drafting room by providing means for wiping out the pen with one hand, while lifting the cork from the ink bottle with the other. Filling the pen is an operation which must be performed so often that this slight saving is of considerable value. A convenient arrangement for this purpose consists of a band of sheet brass around the bottle holder, fastened with a small screw. The projecting end is wrapped with absorbent linen, such as may be produced by washing out scraps of tracing cloth in hot water. A pin is clamped in near the screw, so that the end of the strip of linen will catch on its point and be prevented from unraveling. The pen is wiped with a movement of one hand, as illustrated, the weight of the bottle holder preventing its being lifted off the table.—Q. J. Workman, Cleveland, Ohio.



Much of the Tracer's Time can be Saved if He can Clean Out and Fill His Ruling Pen with One Hand, Leaving the Other Free to Uncover the Ink Bottle

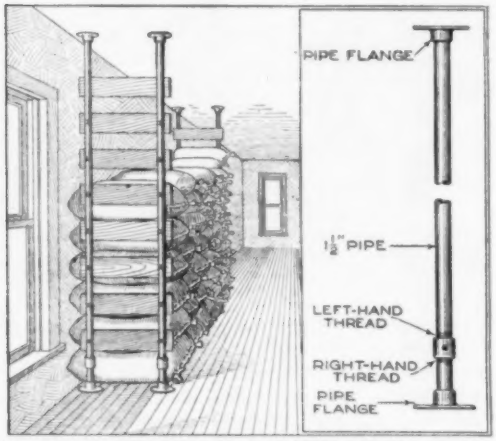
Springless Self-Closing Gate Hinge

A very simple hinge for the farm gate, which possesses great strength and durability, consists of two pieces of pipe and a piece of round bar bent to a right angle. The short piece of pipe should be driven into the larger piece, the lower end of which is flattened and fastened with screws to the post. The upper end of this piece of pipe should be beveled off at an angle of about 30°, so that, as the gate is opened, it will be lifted slightly and its weight will tend to close it without the use of any spring. It is not always necessary to have the two pieces of pipe, but it makes a much stronger and more durable hinge, as the rod does not need to be bent at such a sharp angle, and the larger pipe will cause less strain on the screws which hold the flattened pipe in place.



Movable Posts Made of Pipe Useful in Stock Rooms

The sacks in the picture are held between movable posts, each made of two



Movable Steel Posts, between Which Stock can be Piled Up, will be Found Useful in Many Factory Stock Rooms

pieces of pipe, two flanges, and a coupling. At the coupling, both pieces of pipe are threaded with a straight thread, not a pipe thread, one being right-hand and the other left-hand. The coupling is threaded internally, to correspond with these, and is adjusted like a turnbuckle, a hole being drilled through the center of it, to take an iron rod, as a wrench. To move the posts from one place to another, it is only necessary to loosen this coupling, move the posts, and again tighten it up.

Repairing a Cracked Water Jacket with Cement

A 10-hp. gasoline engine suddenly developed a crack in the water jacket, and was put out of commission. As the location was far from a repair shop, an emergency repair was attempted with cement. It was found that by having a rough boxing built around the cylinder and a few inches above it, and pouring in a mixture of 1 part Portland cement and 3 parts sand, with a few iron bars laid across it to prevent cracking, the crack was plugged so that no water leaked. After the cement had dried, the engine ran as well as ever.—H. S. Rich, Cromwell, Conn.

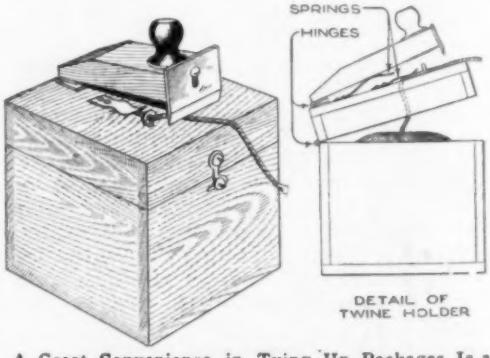
¶Where rubber gaskets might be objectionable, as on cooking utensils, tin foil is very useful for the purpose.

Lighting a Fire at the Top Saves Fuel

Although a coal fire always burns better, especially at the start, when lighted from the bottom, it has been found to be much more enonomical of coal if the paper and kindling wood are placed above the coal. A few small coals and cinders are spread over the top of the kindling wood to enable a coal fire to be started. After the top layer begins to burn properly, the fire will spread slowly downward, if the air draft is right. This method secures the most complete combustion, because the gases from the unburned coal at the bottom must pass through the burning layer at the top, and thus become completely burned. It is admittedly harder to build and control this kind of a fire, but the saving in fuel often justifies the extra trouble.

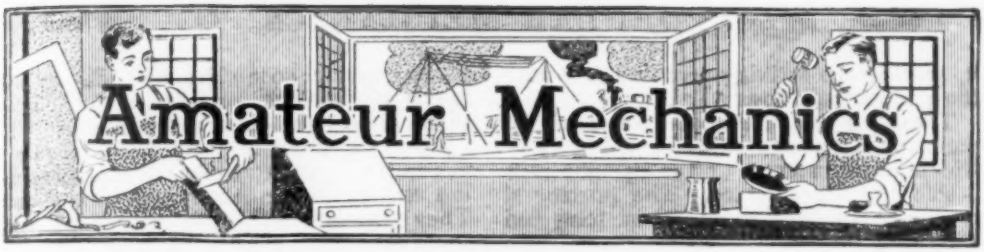
Handy Twine Holder and Cutter

To make a very convenient holder and cutter for twine, place the ball of twine in a wooden box, with the end coming out through a hole in the lid, over which a flat spring is fastened so as to hold it from slipping back into the box. From this spring the twine comes out under the knife, which may be made from a piece of a saw or a safety-razor blade. The knife is mounted on a block which works on a hinge, as shown. Another flat spring is mounted under the block, to keep it away from the twine while it is being drawn out. To cut off the twine, simply strike the knob on top with the



A Great Convenience in Tying Up Packages Is a Twine Cutter, Which Never Gets Lost and can be Operated by Striking the Hand against a Knob

hand, bringing the knife down on the twine. The knife should be removed and sharpened when necessary.—Chandler H. Montgomery, Piqua, Ohio.

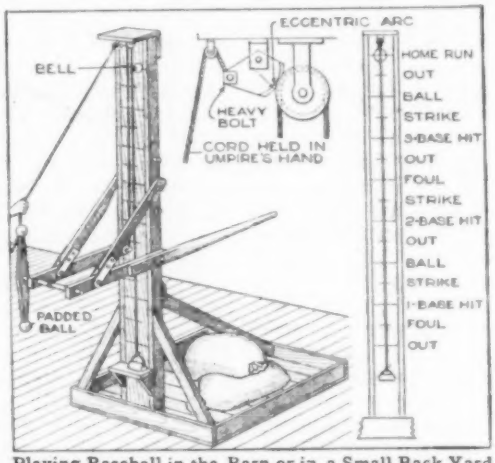


A Baseball Batting Machine

By A. D. GOODRICH

WHEN winter snows and spring rains keep the baseball fan indoors, his interest in the game by no means dies out. If he has a gymnasium large enough for a good game of indoor baseball, he may find in this way consolation for the impossible condition of the diamond. For those who have no access to such a gymnasium, a great deal of fun can be obtained from a batting machine, with which a complete imitation game of baseball can be played by any number of boys. The materials can usually be found in a wood pile or about the house, or can be obtained at the cost of only a few cents.

The upright, or score board, of the machine should be of good clear lumber ⅞ in. thick, 4 to 6 in. wide, and 12 or 14 ft. long. It should be supported on a base and firmly braced to take the shock from the bat. If this base is boarded over on the bottom, it will be much stiffened and then can be weighted down with sandbags, or any other heavy object which can be thrown onto the floor of the base. The upright should be strengthened by two rails of the same length, nailed to its sides. It is not absolutely necessary that these reach the whole length of the upright, but if they do, the job will look much neater. At the top a block of wood projects out a few inches in front of the score board, being set with the grain at right angles to the face of the score board, so as to avoid splitting. To this block is attached a pulley. This completes the stationary part of the machine.



Playing Baseball in the Barn or in a Small Back Yard is Made Entirely Possible with this Machine, Which Imitates Closely the Actual Game. The Players Score Hits and Runs as in an Actual Game of Baseball

The ball which is struck with the bat may be an old croquet ball, cut down, if desired, and covered with some form of padding to a depth of ¼ or ½ in. It is mounted on one end of a piece of ⅞-in. wood, 3½ in. wide at the center, and tapering down to 1 in. at the ends. At the other end of this arm is mounted another wooden ball which serves merely to counterbalance the weight of the batted ball, and therefore need not be padded. The two balls should be painted different colors, so that one may be sure at all times that he is striking the padded ball and not the counterbalancing one. Holes, about ⅞ in. in diameter, are bored in the balls and they are set on the ends of the tapered piece, which are rounded off with a knife or chisel to fit the holes. Nails are driven through to hold them on, and a long nail also serves to hold the taper piece or striking arm tightly on the shaft. This shaft may be made of ⅜ or ½-in. round iron, if convenient; otherwise, a piece of broomstick will serve. If the diameter of the shaft is less than 1 in. or 2 in., depending on the size of the cord and the weight used, it should be enlarged by winding hard paper around it, in order to get the necessary diameter for winding up the cord. This cord should be strong but very flexible, so as to run freely over the pulleys; a good quality of fishline will do very well, but if this is not at hand, common hemp twine will give good results. The line should be tied around the shaft and tacked at the proper side of

it, so that the striking arm will rest with the padded ball downward.

The bracket in which the shaft is mounted is made to swing on the bolts by which it is fastened to the upright rails beside the score board. The horizontal pieces of the bracket are 22 in. long and 4 in. high, and are bolted to the upright rails at a distance of 42 in. from the ground. A long lever extends back from one of these horizontals, by which the position of the ball can be shifted up and down. The two hooks which fit over pins on the upright rails are for use when it is desired to hold the ball in a stationary position.

The cord passes around the two pulleys shown, down to a weight, which may be a piece of pipe or other scrap of metal of the proper weight, which can best be determined by experiment. Near the top of the score board, at the mark representing "home run," a bell may be located, so that the powerful batsman who knocks a "home run" is notified of the fact by a tap on the bell. An old doorbell, bicycle bell, or a bell from an alarm clock, can readily be rigged up to ring as the weight reaches the proper height. To avoid breaking the cord when the weight falls to the bottom of its travel after the ball has been struck, it may be well to build a platform, on which it will come to rest at the same time that the cord becomes entirely unwound from the shaft.

In marking the different points on the score board, the suggestions given on the sketch may be followed or not, according to the preference of the players. It will be seen that the success which a batsman has in making progress toward a run is largely a matter of chance, just as it is in a real game. He may, for instance, hit the ball hard enough so that in the real game it would represent a three-base hit, unless it was caught by one of the opposing team. This is represented on the machine by having a mark to represent "out" at various intervals along the scale, as all that the batsman can do either in the game or on the machine is to strike the ball as hard and straight as he can, and trust to the inability of the fielders to get under it, in the case of the actual game, or to the chance of the weight rising to one of the lucky marks rather than the unlucky ones, in the case of the machine. While the imitation is not so perfect in the case of fouls and "balls," the game as played on the machine will be found sufficiently interesting.

To start the game, any number of players may choose sides, and toss up for the choice of "ins" or "outs." Each side then chooses one or more "pitchers." The "pitcher" of the "out" team takes his place at the long handle, while the members of the "in" team take their turn at the bat. They are called in the proper batting order, until three of them have been retired, as in the actual game. It is well to have certain places near the machine designated as bases; as a player scores a "single," he then takes his place on first base. If the next man scores a two-base hit, the first moves to third base, and so on. The pitchers should manipulate the lever so that the ball rises and falls slightly as is the case with a pitched ball. The reason for having the lever quite long is to prevent the ball being moved too quickly to represent the pitched balls which the batsman should have to contend with. If the pitcher really tries, he can imitate closely various types of pitching, and this will add greatly to the interest of the game.

It will be the duty of the umpire to watch closely the height to which the weight rises at each stroke, and call off the strikes, balls, etc. If there is nothing to prevent the weight from falling back as soon as the energy of the bat stroke is used up, it will take careful observation to determine the mark reached each time. A little device built on the top of the machine will remedy this, and remove most of the opportunity for wrangling over the umpire's decisions. This device is a check or friction clamp for the cord, as shown in the detail at the center of the illustration. When the padded ball is struck and the cord begins to wind up, the eccentric block of the check device loosens and lets the cord pass through with but little friction. When the cord has reached the limit of its travel and begins to unwind, the eccentric surface of the block, forced against the cord by the pull of a small weight at the left end of it, clamps the cord tightly, and prevents it from falling until the umpire has had plenty of time to "see the play." He then pulls the string, which passes through a screw eye to the eccentric block, releasing the main cord, and restoring the ball for the next stroke of the bat.

¶ Paint is readily cleaned with a damp rag dipped in the best quality of whiting. A little rubbing will remove dirt and grease.

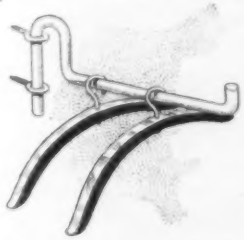
Tinting Photos without Special Coloring Matter

Seashore scenes, sunsets, etc., show up well in a photograph which is tinted to an even pink. Yellow gives a pleasing effect for some prints, as do also purple and red. The latter is especially appropriate for fireside interior scenes. To obtain these tints, expose gaslight paper in the usual way, develop and wash off the developer completely, then dry the prints in the dark room without fixing. When they are dry, expose them to the sun's rays until a tint is obtained considerably deeper than that which is wanted. Then fix the print in the usual way. Such prints are as permanent as those made in the ordinary way.

Another method is to use gaslight paper and print in the sun. Expose until the whole image is a dark purple. Immerse it in an ordinary fixing bath, which will at once tone and fix it. The color of prints made in this way is yellow, orange, pink, red, or purple, according to how long the print was exposed to the sun. In both these methods, good results can only be obtained after some experimenting.—Fred C. Davis, St. Joseph, Mo.

Swinging Clothes-Hanger Rod for Crowded Closet

The bracket illustrated enables clothes, which are hung in a dark closet, to be swung out where they can be examined in the light. A piece of brass rod is bent to the shape shown, and is hung in two stout screw eyes. On this rod the clothes hangers are hung. The size of the materials used will depend upon the weight of the clothes to be accommodated. For heavy suits or overcoats it may be advisable to use heavy U-bolts with a piece of iron pipe forming the swinging bracket.—Mrs. Grace E. Willey, Concord, N. H.



Renewing Old Paintings with Alcohol

The photographs show an oil painting before and after the application of the following method of removing cracks and blemishes in it: Fill a shallow dish with alcohol, and place the picture downward over it, taking care that it does not actually touch the liquid. The fumes from the alcohol rise to the paint, and in a few minutes the cracks fill up and the colors appear bright and new. It is necessary to watch the process closely, for if the painting is exposed to the fumes too long, the colors will run together and the picture will be spoiled. With reasonable care, this should never happen, and old paintings, which would otherwise have to be thrown away, can be made as good as new.—S. Leonard Bastin, Bournemouth, England.

A Painting with Numerous Cracks was Exposed to Alcohol Fumes, and the Photograph at the Right Shows the Wonderful Change Made

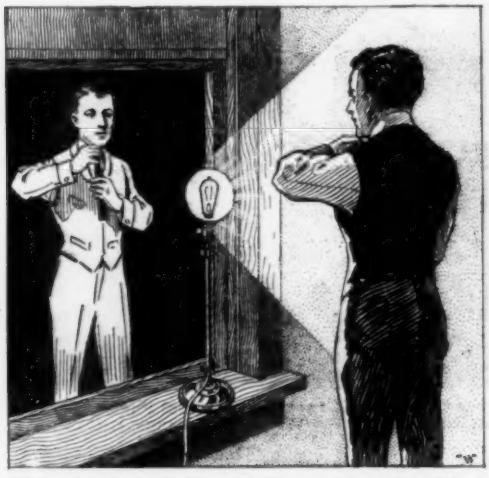
Linoleum Stamps

Handy stamps to supplement, or take the place of rubber stamps, can easily be made from ordinary linoleum. First, draw the design on paper, under which has been placed a piece of carbon paper, coated side up. After the design has been finished, it will appear on the reverse side of the paper as it should on the stamp. Then transfer the design to the linoleum with carbon paper, or paste the paper itself on the linoleum. With a knife cut away the surface of the linoleum to the depth of about 1/16 in., everywhere except where the impression is to be made. Cut out the portion of the linoleum containing the stamp from the remainder of the

piece selected, mount it with glue on a small block of wood, and the stamp is completed.—D. G. Humm, Torrance, Calif.

The Window as a Mirror

Everyone has noticed that under certain conditions he can see his image with



When the Light is Properly Directed So as to Make the Image Distinct, a Window Makes a Very Satisfactory Mirror

tolerable distinctness in a window pane. By proper arrangement of the electric light in a dark room, the image can be made quite plain, enabling one to use the window as a mirror. The illustration shows the proper position of the light for the purpose. The effect will be best when there is no light entering the window from the outside.—M. Tomasulo, Easton, Pennsylvania.

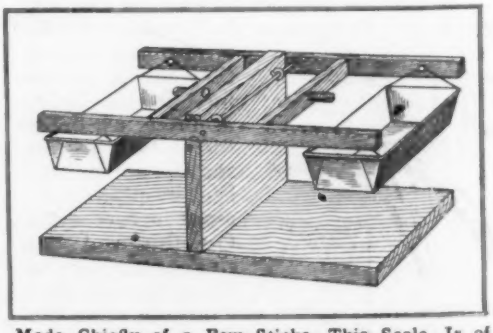
Protecting Checks with a Typewriter

For those who occasionally write a check, but whose bank account does not warrant the purchase of a check-protecting machine, it may be interesting to know that a check may be written on a standard typewriter which will put considerable obstacles in the way of anyone who might try to raise the amount for which it is written. This is done by rolling up on the typewriter platen an ordinary thick blotter, so that two or three thicknesses act as a cushion for the type; the check is then inserted and is written with a heavy touch on the typewriter. Unless the type is worn very smooth, the letters can be pressed into the paper so that an effect similar to embossing is obtained. This would, of course, not be a formidable obstacle to a professional check raiser, but a somewhat more effective one is found in punching holes directly in front of and after the amount of the check, by means of the hyphen or period. On most typewriters, these characters will so tear the paper that it would be next to impossible to conceal effectively any tampering with the check.

Homemade Scales

Toy scales of this type can be made from berry boxes, butter trays, or pasteboard cartons, but more substantial, practical scales should have pans made of bread tins, or stout flat boxes of wood, or other durable material. For removable scoops, four pans can be used instead of two, or a frame of wood or iron may be made to fit and hold the pans. The beams are two uniform, straight strips of wood, fastened together with two braces, which are somewhat longer than the pans, uniform and equidistant from the center so as to balance well. Two rather heavy bolts or screws, run through holes in the crosspieces, take up little inequalities in weight, and enable one to adjust the scales to an exact balance.

The base is a board somewhat longer than the beams, and carries an upright support, or fulcrum, high enough to keep the pans from touching when in balance, even when the load is on one side of the pan, tilting it out of level. A stout cord, or wire, from both corners of the pan, on each end, runs over a tack near the end of each of the two beams. A supporting strand of wire connects the centers of the two beams. Screw eyes in the upright, as far apart as convenient, hold the wire support. It is important to remember



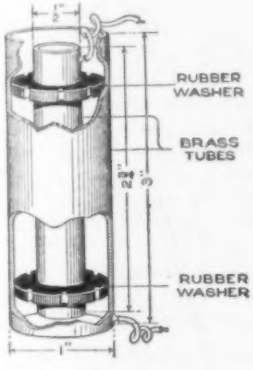
Made Chiefly of a Few Sticks, This Scale Is of Much Practical Usefulness, Besides Being an Instructive Toy

that the holes for the wire in the middle of the beam must not be lower than the tacks at the end, or the

scales will never come to rest in a horizontal position. Also, the greatest care must be used to get the end tacks equidistant from the center holes, or the scales, even though they can be made to balance, will not weigh correctly. For greater sensitiveness, a triangular strip of wood or metal, sharp edge down, can be substituted for the string or wire support in the center, thus making the support somewhat firmer and the balance more delicate. For weights, bags of sand will serve, or tin boxes filled with sand or other heavy material, carefully weighed from accurate standards.—Frank M. Rich, Paterson, N. J.

Electric Water Heater Uses Water as Resistor

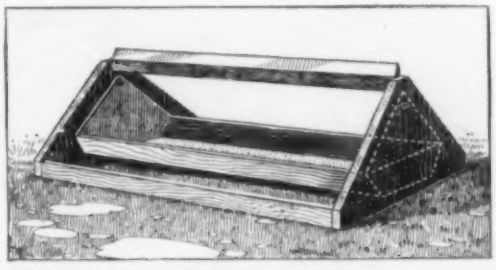
Probably the simplest form of electric heater for use in heating small quantities of water consists of two conducting surfaces placed at a fixed distance from each other in the water, the current then flowing directly through the water from one plate to the other. The water is heated by its own resistance to the passage of the current. This method will not work with distilled water, as practically no current will flow through pure water; ordinary drinking water, however, contains enough mineral matter in solution to permit the use of this principle in a heater. A convenient form consists of two brass tubes, one inside of the other, separated by two rubber washers, which have notches or holes made in them, to permit the water to circulate freely between them. One wire is soldered to one end of the inner tube and the other wire to the opposite end of the outer tube.



The heater of dimensions given in the illustration will not take more than a few amperes at 110 volts in ordinary water. It should not, of course, be used with sea water or other water containing much mineral matter, except on a much lower voltage. In any case, care should be taken that the circuit is properly protected by a fuse before inserting the heater in the vessel of water.—D. J. McKean, Alameda, Calif.

Feeding Tray for Chickens Enforces Cleanliness

The illustration shows a feeding tray for use in feeding corn or other fattening

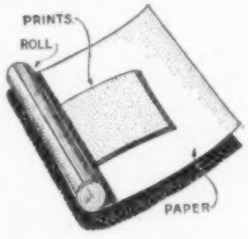


The Tray Keeps the Chicken Feed Clean. Hens Which Jump into It are Quickly Frightened by Its Movement and Soon Learn to Feed without Venturing beyond the Outer Rail

foods to chickens. It is often troublesome to induce the fowls to keep this kind of food reasonably clean, as they like to step into it and scratch, wasting and soiling the food. By placing the grain in a tray, which hangs from two nails above and swings freely upon them, the hens are prevented from jumping into the tray, as the movement due to their weight will frighten them so that they will prefer to stay outside. With the addition of a sharp edge on the upper brace, the tray almost entirely prevents the soiling of food by the chickens.—William Schlawitz, Arlington, N. J.

Straightening Out Photographic Prints Which have Curled Up

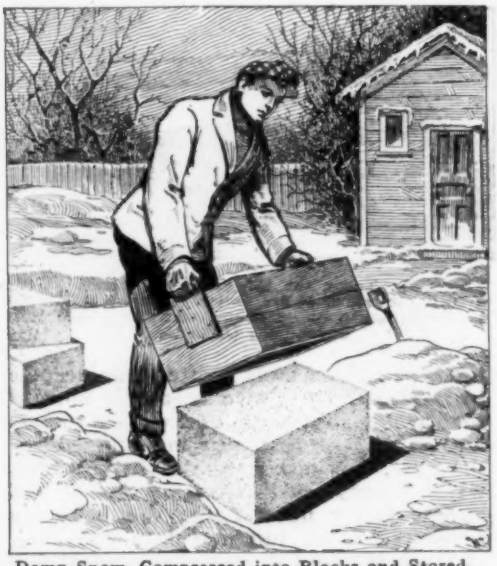
The amateur photographer who finishes his own work is often puzzled as to how to make his prints lie flat. By using the following simple device, prints can be straightened in batches in a few moments, and will retain their shape.



Glue a piece of heavy wrapping paper to a wooden cylinder, or a mailing tube, so the paper will extend about 2 ft. Then, when the prints are dry, lay a batch of them, face down, on the inside of the paper, roll them up tightly, and slip on an elastic band to hold them in place. Set away for about five minutes, and when unrolled, the prints will be perfectly flat.—L. B. Robbins, Daytona, Florida.

Making Ice from Snow

A farmer has tried, with considerable success, the method of making ice in winter by compressing snow into blocks and



Damp Snow, Compressed into Blocks and Stored, Is Nearly as Lasting as Natural Ice

storing it like ordinary ice. A wooden box or frame is made without top or bottom, but with a handle at each end, by which it is lifted. When plenty of snow is on the ground, damp enough to stick together, a large pile of it is collected by means of a horse-drawn drag. The snow is then shoveled into the frame, or mold, and packed down tightly. If the snow is not wet enough to pack well, a little water can be thrown into it, but no more water should be added than is necessary to produce a compact, heavy cake. The frame is then removed by its handles; the snow block is taken away to be stored, and the mold is ready to be filled again. It is found that while the blocks are in storage, the snow consolidates. The two chief advantages are that the blocks are in more convenient shape, being as thick as desired, and that they are much cheaper to obtain.—John B. Smyth, Pittsburgh, Pa.

Mop Made from Package Strings

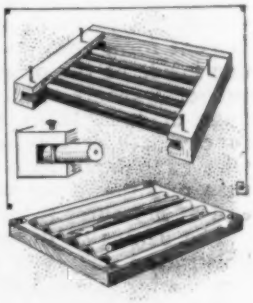
A collection of strings taken from packages, instead of being thrown away, can be made into a mop. Cut the strings to a length of about 3 ft. each, and hang them over a horizontal wire so that the ends are about even. When a sufficient number is thus collected, wind the wire, with strings hanging from it, around the end of a piece of broomstick, fitting the wire into a groove cut around the broomstick for the purpose. Wrap with heavy cord or smaller wire, and the mop is ready for use. A mop so made has been in service for over three years.

Shaking Down a Fever Thermometer

Many people have difficulty in shaking down fever thermometers. Best results are often secured by not shaking the thermometer at all, but holding the upper end of the thermometer in the fingers and swinging the arm around repeatedly. If this is not found convenient or effective, or if one wishes to avoid the danger of swinging the thermometer against some object and breaking it, place it in its case and tie a string to the case, so that it hangs from the string with the thermometer right side up. Then catch the string a foot or two from the thermometer case and whirl the instrument around rapidly. The centrifugal force brings the mercury column down with very little effort on the part of the operator. This method is used effectively in scientific instruments, and should be better known among users of fever thermometers.

Handy Pen-and-Brush Tray Made of Blotting Paper

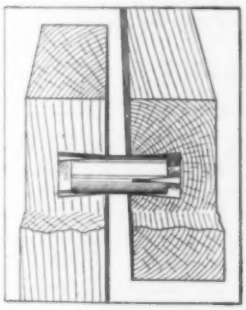
A very handy article on the desk or drawing table is a pen-and-brush tray made of blotting paper, formed into grooves or corrugations just the right size to take a pencil or penholder. The blotting paper, after being formed to the proper shape, must be held in shape while being glued to the pasteboard, and until the glue hardens sufficiently to hold it. If one wishes to make a number of such trays, a frame, such as shown in the sketch, will make the work of forming the blotting paper very easy. A number of round sticks, about the size of the penholders or brushes, are obtained; lead pencils may be used, espe-



cially if they are of an extra-large diameter. They are mounted in the frame, which may be made of wood or pasteboard, so that they slide freely up and down. The blotting paper, preferably of two or three thicknesses, is threaded in and out over the round sticks or lead pencils, and when it is all in place, two small nails over the ends of the bars or lead pencils will hold the blotting paper tight. While still in this frame, glue may be laid in narrow lines between the lead pencils on one side, and the pasteboard may be pressed on and the glue permitted to harden. The alternate lead pencils, confined under the blotting paper, are then pushed out at the end, and the pen container is ready for use. It may be trimmed off, mounted with thumb tacks on a wooden block, and painted or ornamented to suit the maker's taste.

Invisible Joint Holds Wood Firmly without Glue

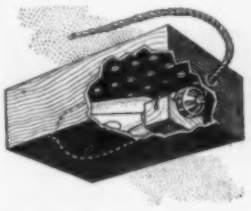
It is possible, by the method shown, to fasten together securely two pieces of wood, 1½ in. thick or more, so as to leave absolutely no external mark to show the nature of the fastening. The dowel pin is slotted and provided with two wedges, whose length must be carefully determined by experience in making such joints, as it depends largely on the kind of wood and tightness of the fit. For a firm joint, each hole should be recessed out with a gouge, so as to be larger at the bottom than the pin, and make room for a wedge of appreciable thickness.



To prevent turning, two or more such pins may be inserted side by side. The chief problem in such cases is to line the several holes exactly with those opposite; this may be done quite accurately by fitting into the finished holes in one of the pieces to be joined, short pieces of iron rod with sharp edges, so that they all stand out a short distance above the surface. The other piece of wood is then laid in place and struck a blow with the mallet, thus marking exactly the position of the holes to be bored in it.—Chas. A. Black, Jr., Hightstown, N. J.

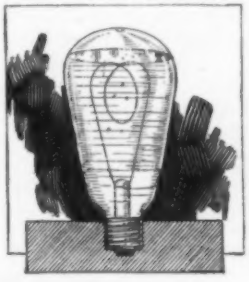
Electric Foot Warmer is Cheap Luxury

Nothing is more comfortable when coming into the house on a cold night than an electric foot warmer. A very cheap and efficient form consists of a wooden box, about 10 in. square and 6 in. high. The cover of the box should preferably be of metal, with holes drilled to facilitate the passage of heat in an upward direction. There should also be one or two holes in the lower part of the box for entry of air. The heating unit is an ordinary carbon-filament electric lamp, which can be mounted in a keyless socket with a cord leading out through the end of the box to an attachment plug. If it is preferred to have a top surface which does not heat up so rapidly, but eliminates the possibility of getting too hot for comfort, a wooden top may be used, but it should be lined with asbestos. Either the top or bottom should be attached with screws, so as to be removable for renewing the lamp. If the lamp comes close to any of the wooden surfaces, an asbestos lining is advisable, as a lamp inclosed this way may become very hot. A 16-cp. carbon lamp will furnish more than enough heat.



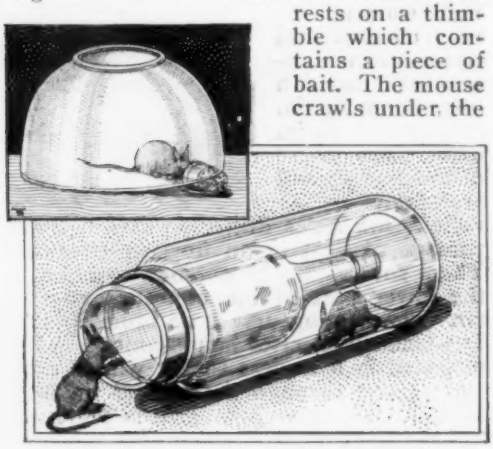
Electric Lamp as an Oil Container

An incandescent lamp which had a broken filament was used as a can to hold kerosene for an oil stone. It was filled in this way: The large end was inserted in a vessel of kerosene, and the tip knocked off with a file or knife. The vacuum inside the globe caused the oil to rush in until the globe was nearly full. To throw oil on the stone, the globe is inverted and a few drops are shaken out from the hole where the tip was. The lamp can be kept very handy in a hole drilled in the bench, or in a block large enough to take its threaded base.—Gus H. Klinck, Jr., Summerville, S. C.



Mouse Traps Made from Familiar Household Objects

Two ways of capturing mice are shown in the illustration. In the small picture, a glass tumbler or bowl is inverted and rests on a thimble which contains a piece of bait. The mouse crawls under the rim of the bowl, drawn by the smell of the bait, and in endeavoring to extract it from the thimble, is sure to shake off the bowl, in which the mouse then finds itself imprisoned.



By the Use of Familiar Glass Objects, Mice are Caught Alive without Injury, and may be Killed in Any Way Preferred

In the large picture, two glass bottles are used, the larger one having a wide mouth, somewhat larger in diameter than the body of the smaller bottle. The small bottle should have a neck about ¾ in. in diameter, and its bottom should be cut off, by means of a hot iron wire stretched around it, or by some other method. It is fitted into the larger bottle, with a strip of felt, or other packing, to fill the space between it and the mouth of the larger bottle. Its neck should extend to within 1 or 1½ in. of the bottom of the larger bottle. The bait is placed in the larger bottle, where it is in full view of the mice. They will ultimately find their way to it, through the neck of the inner bottle, but will have much greater difficulty in making their way out again, if the neck of the bottle is placed the proper distance from the bottom.

After the mouse caught in the trap is examined, it can be killed by pouring in water. In the case of the bowl trap, slide under the bowl a piece of pasteboard with a hole too small for the mouse to escape through; then turn the bowl right side up, keeping the pasteboard over it, and pour in water through the hole, setting a weight on top of the pasteboard. The bottle trap need only be set on end, and water poured in through the open end of the inner bottle.

Using a Three-Cornered File as a Glass Cutter

When no glass cutter is at hand, and a piece of window glass must be cut, use a three-cornered file. Break off the tip, so as to get sharp points of contact, and scratch the glass in the same manner as with an ordinary glass cutter. A little more pressure and care are required, but good results can be obtained.—R. J. Stephens, Kansas City, Mo.

Use Envelopes Over Again

A good way to save money spent in buying envelopes is to save all the envelopes received by third-class mail, until a number have accumulated, and, after soaking them in water for a few minutes to soften the mucilage, turn them inside out, and stick them together again. They are then as good as new blank envelopes, and with the present high price of paper, this method will save a good many pennies.—Victor H. Todd, Orange, New Jersey.

Bird Cages Made from Wire Fencing

A large cage for a parrot can readily be made of wire fencing. The bottom of the cage is made from a galvanized-iron pan, or from the bottom of an old gasoline can, and at the top of the cage the wires are bent over, forming a conical top. The ends of the wires are fitted into a piece of sheet iron bent to the shape of a cone, or better, to an old lubricating-oil can which has the stem and bottom removed. An iron ring through the top serves to hang up the cage, and any other fittings desired can be mounted. The bottom of the cage may easily be made removable and may take the place of a door, or a hole can be cut in the fencing, and a door of sheet iron, or woven wire, fitted.—Chas. A. Black, Jr., Hightstown, N. J.

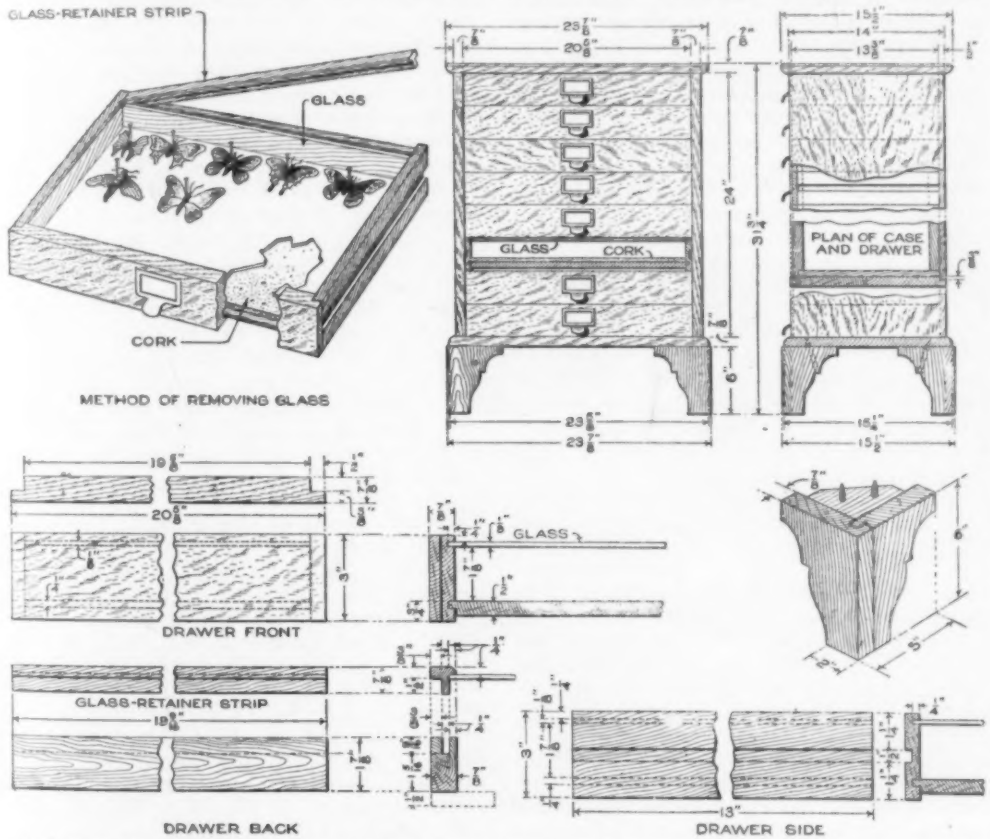
A Collector's Cabinet

By CHARLES A. KING

A MOST useful object to the collector of insects, coins, minerals, or small specimens of any sort, is a conveniently arranged case or container, which will be dust and moth-proof, and permit the collection to be examined without handling the specimens. The cabinet here described was built and used for a collection of insects, but it is suitable without any change of dimensions for various other purposes, and it is not difficult to make the drawers a different height, if required for the purpose in view.

The size of the glass is 12 by 20 in. This glass top fits into grooves in the drawer sides and front, and is held at the back by a strip of wood, which is easily lifted out, permitting the glass to be slid out through the back of the drawer. Each drawer has a groove in each side on which the drawer slides to position in the cabinet, there being eight wooden strips, or drawer runs, on each side of the cabinet, which are a working fit in these grooves. The drawer runs are securely nailed and glued to the sides of the cabinet and permit each drawer to be removed and replaced independently of the others. The height of the cabinet as mounted on the legs, shown in the sketch, makes it convenient to take out any one of the drawers and set it on top of the cabinet.

The drawers are each 3 in. high, less the amount necessary for clearance between them, which will be about 1/16 in. or less, depending on the accuracy of the work. There should be a space of 1 7/8 in. between the bottom and the glass, in order to permit an insect pin, 1 5/8 in. long, to be used. The drawer front is grooved near the top for the glass, and near the bottom to take the drawer bottom. The sides are grooved correspondingly, and have the additional groove to rest on the drawer runs. The drawer back is made the same height as the distance from the



A Cabinet for Preserving Specimens: Each Drawer Has a Cork Bottom to Which the Insects or Other Specimens may be Fastened, and a Glass Top Which is Readily Removed, When the Drawer is Out of the Cabinet, by Lifting the Retainer Strip at the Back of the Drawer

drawer bottom to the glass, which, in the cabinet illustrated, is 1⅞ in. In the top of the drawer back is cut a deep groove, and the glass-retainer strip is planed off to fit into it, bringing the height of the drawer back to the same height as the sides. The various grooves may all be made with a groove or plow plane, but more exact work will be obtained by preparing the material at a mill, where there is a fitting saw. The drawers must all have the same horizontal dimensions, and these must be quite accurate, as otherwise they will not fit the case. The dimensions in the sketch are worked out on a 12 by 20-in. piece of glass as a basis; this should be kept in mind, if it is desired to change the dimensions and use some other size of glass. The bottom of each drawer should be covered with some material into which pins can easily be stuck, to hold the specimens. Sheets of cork, about ⅛ in. thick, are best suited for this purpose, but soft wood or corrugated packing paper will be entirely satisfactory.

In nailing the drawers together, the important things to be considered are the grooves to take the glass, which must coincide all around, and the grooves for the bottom, which should coincide quite closely for a neat job. The bottom of the drawer back should be flush with the top edge of the bottom grooves in the sides, and the top of the drawer back must be flush with the upper edge of the glass grooves in the drawer sides, to insure that the glass will slide into its place easily. Glue and nail the corners, but do not glue the bottom, or it may shrink and split, thus offering access to pests; instead, fasten it in place by nailing to the bottom the lower edge of the drawer back. The glass retainer should fit quite snugly, but not so tight that it cannot be removed easily. Note that the upper front edge of the glass retainer is beveled slightly to avoid danger of its catching on the bottom of the drawer above, when its own drawer is removed from the case. The bottoms of the drawers should be planed smooth all around, front and sides.

If it is desired to have all drawers interchangeable, which is very convenient sometimes when rearranging the specimens, it will be necessary to make the vertical dimensions of the drawers also very accurate. The sides of the cabinet can then be cut easily to dimensions, and the drawer runs set in place by measuring with a rule. Any drawer which does not fit in all eight places must then be dressed off until it does. If one does not care for the feature of interchangeable drawers, it is easier to follow this method: To find the length of the sides of the cabinet, stack the completed drawers, one upon the other, with a piece of cardboard between them to allow for clearance, and measure the extreme height of the pile, which will then be the length of the sides of the case. If it is found that there is much difference in the height measured at the four corners of the stack of drawers, some of them must be dressed off to bring the height at all four corners to the same figure. This height is then measured, and the sides are cut to it easily. Then, when the cabinet sides, top, and bottom are fastened together, pile the drawers in the case with the cardboards between them, numbering them from one to eight, so that they may always be put in the place where they are fitted. With a sharp pencil, or knife point, mark upon the back and front edges of the sides the exact location of the top of the drawer-run grooves in each drawer. The drawers are then removed, and the drawer runs are set by these marks, each drawer thus taking the exact position it occupied when the marks for the runs were made. The runs should be planed a little smaller than the grooves in which they are to fit, and should be securely nailed into place with 1-in. No. 16 brads. They should be glued for not more than 2 or 3 in. from the front edge, or there may be trouble, due to warping of the cabinet sides.

The width of the cabinet sides depends upon the depth of the drawer; the sides should be ⅝ in. wider than the drawers are deep, as a ½-in. back is used, and the drawers should rest ⅛ in. back from the front edges of the cabinet sides. Thoroughly dried quarter-sawed stock should be used for the cabinet sides, to insure against warping. Rabbet the back edges of the sides ⅜ by ½ in., to receive the back of the cabinet. Fit the back in place with its grain running horizontally, being careful that the sides are not sprung, or the drawers will not fit as they should.

Cut the top and bottom to the size indicated, and round the corners, as shown; they may, of course, be left square, but a good appearance will result if they are rounded, and care is taken that the rounded-off portion is confined to the part of the top and bottom which projects beyond the cabinet sides and drawers. The cabinet sides may be set in place on the bottom, and the top fitted to them, while the drawers are piled up inside. This will permit a good fit between the drawers and the sides of the cabinet, which is very im-

portant for easy working of the drawers. The top and bottom can be nailed with 8 or 10-penny finishing nails. If a finer piece of work is desired, the top may be doweled on, and the bottom fastened with 1¾-in. No. 10 screws.

If the case is to be set upon a table, the legs may be omitted; otherwise, they may be made as shown in the sketch, mitered and nailed at the corners, or glued together, as indicated. In this case, four of the pieces must be cut a little wider than the others, and they should be fitted so that the joint does not appear at the front. The legs may be fastened to the bottom of the cabinet by screws, as shown, but if a stronger fastening is deemed advisable, a block can be set inside the angle formed by the legs, and screws run from this block into the bottom and into the legs.

When all the drawers are fitted in their places, if they do not run easily, they should be dressed off until they do. Rubbing the drawer sides with paraffin will make them work more easily.

The stock list, giving finished dimensions of material required to make the cabinet shown in the drawing, is as follows:

8 Glass-retainer strips, ⅞ by ⅞ by 19 9/16 in.	2 Cabinet sides, ⅞ by 14 by 24 in.
16 Drawer sides, ½ by 3 by 13 in.	1 Top, ⅞ by 15½ by 23⅞ in.
8 Drawer bottoms, ½ by 12⅝ by 20⅛ in.	1 Bottom, ⅞ by 15¼ by 23⅞ in.
16 Drawer runs, ¼ by ½ by 12⅝ in.	1 Cabinet back, ½ by 24 by 21⅝ in.
8 Legs, ⅞ by 6 by 5 in.	8 Drawer fronts, ⅞ by 3 by 20⅝ in.
8 Panes of glass ("Single Strength"), 12 by 20 in.	8 Drawer backs, ⅞ by 1⅞ by 19 9/16 in.

Tin Cans Made into Tin Cups

An old tin can, especially of the smaller size much used for evaporated milk, can easily be converted into a useful drinking cup. This is especially a practical idea since the price of tin cups has gone up so greatly on account of the scarcity of tin, and because of the fact that the conservation program has found no important commercial use for old tin cans on account of the thin coating of tin which they are given.

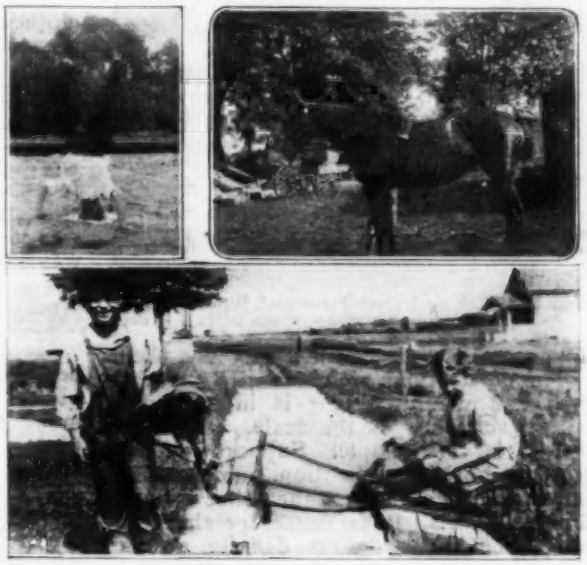
To make a tin cup of one of these old cans in this manner, it is best to use, if possible, an emery wheel, which is mounted so that the shaft does not project very far beyond it. Then, holding the can over the shaft, the top or cover sheet is ground so thin that it can be removed from the can. A smooth edge is left all around, which can be smoothed up further with a fine half-round file. A handle may be formed from a piece of another tin can, cut and bent to the proper shape, and soldered to the cup.—E. L. Howard, Springfield, Ohio.

Insulated-Wire Handle for a Pail

A handle which is as good as a wooden handle for the bail of a bucket consists of some large insulated copper wire wrapped around the bail and covered, if desired, with a layer of tape.

Photographs Illustrate Camouflage

Practical examples of "camouflage" are shown in these three photographs.

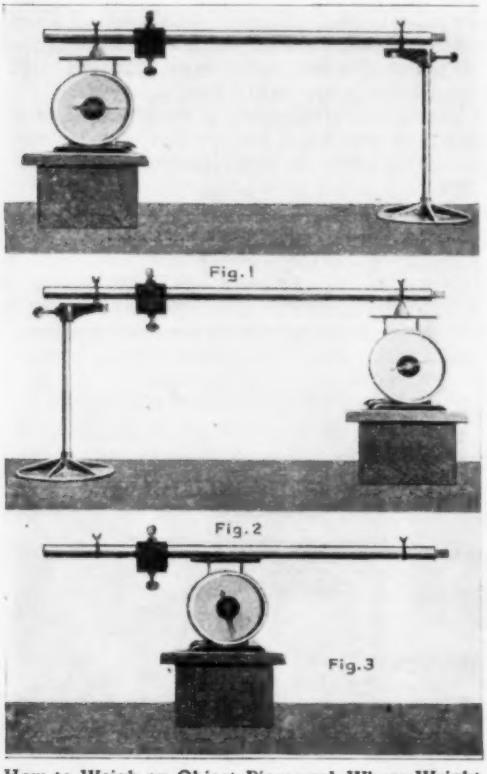


Three Photographs Which Prove That Camouflage can be Applied to Familiar Objects in Very Peaceful Surroundings

In the upper left-hand corner the man has adopted an effective, if somewhat strenuous means of making his appearance blend with his surroundings. To the right, the small rider on the horse's back is almost indistinguishable against the background of sky and trees, while the lower picture shows how difficult it may be to distinguish such a striking object as a goat.—A. J. Viken, Waterloo, Ia.

Weighing an Object Too Heavy for the Scale

Figures 1 and 2 illustrate how one may readily weigh upon scales an object whose weight is beyond the limit of the scales.



How to Weigh an Object Piecemeal, Whose Weight Exceeds the Capacity of the Scale

The secret is to weigh it a part at a time.

The illustrations are made with a loaded iron rod whose weight is intentionally within the limit of the scale. The procedure is very simple. Support the object in a horizontal position, one end resting upon the scale pan, the other on any fixed support. It is necessary that the object be supported at definite points. Thus, in Fig. 1, the left end of the loaded rod rests upon a cork trimmed to a sharp supporting edge, which is used because its weight is negligible; the other end rests upon a lead pencil laid upon the supporting body. The dial in Fig. 1 registers 6 lb. Next, interchange the positions of the scale and the fixed support. The dial now registers 5 lb. The true weight of the body is the sum of the two readings (6 plus 5) or 11 lb., as verified by the dial reading in Fig. 3. If a spring balance is used, the operation is even simpler, since the object may be hung by loops of cord from the points in the two chosen positions.

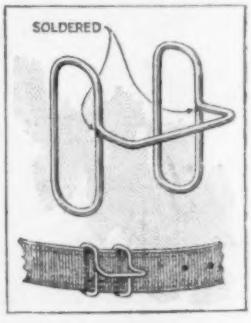
An interesting application of this principle appears in the use of platform scales in weighing a loaded vehicle, where the front and rear wheels are too far apart to permit both sets of wheels to rest upon the platform at once. Driving first the front wheels and then the rear wheels upon the platform and weighing, the two readings are added to obtain the true and total weight. This method is accurate only when the driveway is level with the platform. The axles represent the two definite lines of support. Similarly an animal may be weighed piecemeal on platform scales, placing first the front feet upon the platform, and then the hind feet. The posture of the animal must be the same in each trial.—L. Pyle, St. Louis, Mo.

Simple Way of Preventing Holes in Socks

A man who had to look after his own clothes repairs devised a simple way of preventing holes in his hose. When the heels or toes showed signs of getting thin, he employed small pieces of chamois, or any other thin, soft leather, to stop the wear. The leather was placed over the worn part and attached all around by a few stitches to the material where it was still strong. The leather wore well and was very comfortable, and much darning was avoided.

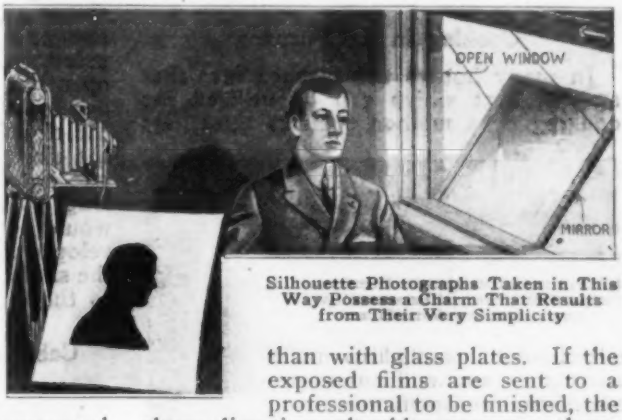
Wire Loop on Belt for Carrying Tools

Mechanics using many small tools find belt loops very handy to carry them. The utility of the loops can be increased by making them so they may be moved along on the belt, or removed entirely. A simple tool loop with these advantages may be made from heavy brass or copper wire, No. 4 or 5 being suitable. The wire is bent into the shape shown, and the ends soldered. The loops should be made in different sizes to take the various tools used. Spring clips, permanently attached to the belt loops, will be useful for holding many small tools.



The Photographic Silhouette

The silhouette is returning to favor. The reason, perhaps, is that in the silhouette we have a type of portraiture which is so free from details that the imagination is stimulated to supply them. In viewing the silhouette of a friend one recalls vividly all those details of feature that do not appear in the outline representation. It is this powerful appeal to the imagination that vitalizes the silhouette. The cutting out of a silhouette by use of scissors is a most difficult and exacting art; but with a camera one may produce a silhouette that excels in both accuracy and effect the scissors-made type. No apparatus is required other than that possessed by every amateur photographer.

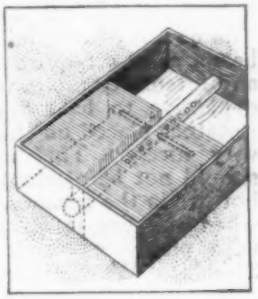


Silhouette Photographs Taken in This Way Possess a Charm That Results from Their Very Simplicity

Choose a room that is lighted by a single window, or a room in which all windows but one can be perfectly shaded. Drape the upper half of the window with a light-proof cloth, and hang outside the lower half of the window a large mirror, say, 2 ft. square, in such a way that light from the overhead sky is thrown straight across the room. An ideal way is to have the bottom edge of the mirror rest upon the window ledge, the top of the mirror leaning outward at an angle of 45°, supported by strings or wires extending from the two upper corners back to the window frame. To make a silhouette of a friend, seat him close to the window, with the profile outlined against the patch of sky as seen in the mirror. Mount the camera back in the room at the desired distance from the subject, focus, and make an instantaneous exposure, or snapshot. Develop the negative until a very black sky surrounds the much underexposed head of the subject. Fix, wash, and dry the negative. Using any contrastive type of paper that gives a pronounced white and black effect, make a print of the negative in the ordinary way, obtaining a jet-black silhouette. In order that all the rest of the print may be a pure white, slip a piece of black paper between the negative and the photographic paper before the exposure and the development of the latter. The black paper should have a hole cut out of it so as to expose that region of the negative containing the sitter and the patch of sky. The head then prints out black, with an expanse of white background. The only precaution is to keep that side of the sitter toward the camera as dark as possible. It will be found that the process can be used somewhat more successfully with films than with glass plates. If the exposed films are sent to a professional to be finished, the above directions should accompany them, as the silhouette effect will be entirely lost unless the directions are followed closely.—L. Pyle, St. Louis, Mo.

Converting an Ordinary Desk Drawer into a Card File

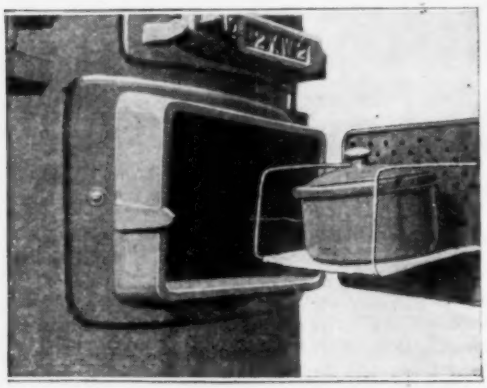
It is sometimes desired to use an ordinary desk drawer as a card file, the cards being arranged so as to face forward as in standard card files. Such drawers are often slightly more than twice the width of the card, making it convenient to arrange two stacks of cards side by side in the drawer. The remaining requirement is, then, some handy device to keep the cards from sliding out of place or falling over. This can be readily done by the use of a roll of pasteboard, such as a mailing tube, or made, if necessary, by splicing together two pasteboard tubes, in order to obtain the necessary length. The roll should be of such a size that, when slightly flattened, it fits in between the two stacks of cards. This forms a convenient separator, and the cards are prevented from falling backward by inserting, through holes in the pasteboard roll, a round stick, or a full-length lead pencil. The holes can be cut with a pocketknife at equal intervals along the roll. As new cards are then added to



the file, the stick or lead pencil can be removed from one hole and placed in the next one, so as to give sufficient room for the new cards.

Cooking in the Furnace

In many houses the furnace furnishes surplus heat which can be utilized for cooking by a method such as this: By



With a Low Fire in the Furnace Some of Its Heat may be Utilized in Baking a Kettle of Beans, Set upon an Iron Rack at the Furnace Door

bending some old iron wire to the shape shown, a rack or shelf is built onto the furnace door, on which a piece of sheet iron is placed to hold a large kettle. The device is especially useful for baking beans, as they require long hours of steady and intense cooking, which makes it quite expensive to bake them in a gas oven. Potatoes placed on the platform also bake very nicely. This method of cooking should not be attempted when there is a hot fire in the furnace, being suitable only when the fire is quite low and covered with plenty of fresh coal.—Mrs. C. F. Stoddard, Washington, D. C.

Ribbed Glass for Auto Headlights

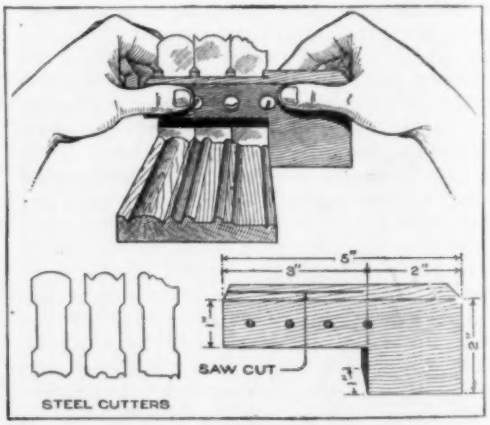
Probably the most widely adopted of the devices for reducing the glare of automobile headlights is the use of some form of rough-glass lens, so that the rays are diffused instead of being concentrated into a single beam. Such lenses can be bought in many different styles, but the cheaper way is to buy at a hardware store some ribbed or figured glass which is manufactured for use in windows. While this glass is usually not of so high a quality as the manufactured lenses, and may not give quite so good a light, the difference will not be great in most cases.

Photographs Taken in the Shade

If one has a camera which does not take good pictures except when the sun is shining brightly, try the following experiment: Take an ordinary subject in the sun, and then take another in the shade, using the same shutter speed and lens opening. Then, in developing, make the developer half strength; that is, dissolve the chemicals in twice as much water as the directions call for. This will necessitate developing the film or plate twice as long. Theoretically, the results obtained would be exactly the same, but when developed in this way, the subject taken in the shade will often be as clear and bright as the one taken in the sunshine.

Cabinet Moldings Made by Formed Scraper Blades

An amateur wood worker who occasionally liked to make moldings, but did not like to go to the expense of buying an expensive plane for the purpose, made a tool like the one here illustrated. The blades are simply pieces of sheet steel which may be made from an old scraper or saw. They may be clamped in the block and used in combinations of one, two, or three blades at a time, depending on the width of molding to be made. Various blades of different patterns can be made in a few minutes with round and three-cornered files, and when dull they can be sharpened with a few strokes of a file. While the method is not practical for making any large number of moldings, it



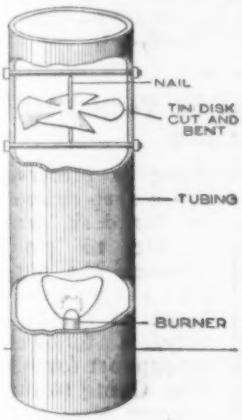
A Few Scraps of an Old Saw or Scraper Blade, Clamped in a Wooden Block, will Enable the Amateur to Make Moldings of Various Designs

is simple and cheap and makes it possible to turn out some beautiful work.—Chas. Illingworth, Mission City, B. C., Canada.

Instrument Tests Gas Burners

When a gas burner is lighted and placed inside a tube or chimney, open at both ends, the speed with which the air inside the tube moves upward depends on the amount of heat developed in the flame. This fact is made use of in the simple instrument illustrated, to test the completeness of combustion produced by various forms of gas burners.

A 2½-in. brass tube, 10 in. long, was used, and near its top was suspended a fan, cut from a piece of tin can, and shaped somewhat as shown. It was mounted on a six-penny finishing nail, the head of which had been removed. The ends were ground carefully to a conical point, and the fan was balanced accurately so that it would revolve very freely, when mounted. This balancing was done by mounting the fan first between centers, with the shaft horizontal, and cutting away metal from whichever side proved to be the heavier.



Two bolts, made from brass rod, were passed through the tube, and small bearings for the ends of the fan shaft were made at the centers of these bolts. The bolts were set the proper distance apart to take the fan shaft between them, one being directly over the other.

When the fan is mounted in place, it is ready to use for testing burners. These should be supplied with gas through a valve, so adjusted that each burner consumes the same amount of gas per minute, this being measured by some suitable means. Each burner should be placed successively at the same point in the lower part of the tube, and left there long enough for the tube to heat up and reach a uniform temperature. The speed at which the air current causes the fan to revolve can then be counted, using an ordinary watch or a stop watch, and this speed is then a measure of the efficiency of the gas burner. Counting the speed of rotation of the fan will be much easier if one blade is painted with a white or red spot before balancing the fan, and greater accuracy is thus secured.—Dale R. Van Horn, North Loup, Neb.

Artificial Flowers Forecast Weather

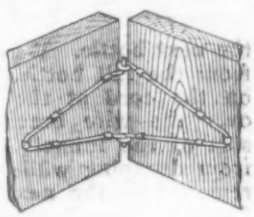
Paper flowers can be made to tell if it is going to rain or not. The petals are painted with a solution of cobalt chloride, a chemical which turns blue when the air is very dry, and is pink in damp air. By using different-colored papers, one can make a curious bouquet of flowers and leaves that will be the proper color only when fine weather is coming. White, pink, and yellow sheets are needed.

Use the white and the pink sheets for making up any kind of flowers desired. These can be mounted on wire or wooden stems. Then, out of the yellow paper, cut the leaves. Finally the flowers and the leaves are all painted or dipped in the cobalt solution, which can be made up as follows by any druggist: Cobalt chloride, 1 part; gelatin, 10 parts; water, 100 parts.

This is how the bouquet works: When rain is coming, and the air is damp, the flowers made of the white paper are pink; those made of the pink paper are also pink, while the leaves, which were made of yellow paper, are an odd shade of orange. This looks, of course, altogether "wrong." But when the air becomes drier—a sure sign of fine weather—the flowers made of white paper become bright blue; those made of pink paper are a fine violet shade, while the leaves are bright green.

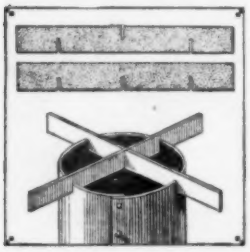
A Hinge Made of Stiff Wire

A hinge for a light door, which is readily made of two pieces of stiff wire and a number of staples, is shown in the illustration. The two pieces are alike, except that one has its ends bent to form the pins of the hinge, while the ends of the other form the eyes in which they work. Each half of the hinge should be mounted in place, leaving one staple off until the door is hung, when the staple is driven which locks the two parts together.—P. T. Hines, Raleigh, N. C.



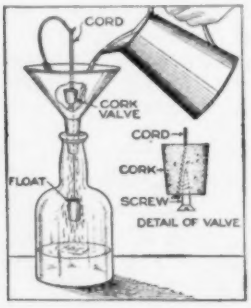
Oil Lamp Made into a Stove

An ordinary kerosene lamp can be converted into an oil stove, for heating water or cooking in small vessels, by substituting for the glass chimney a metal chimney, built as shown in the sketch. It consists of a piece of sheet metal rolled up and riveted, or a piece of small-sized stovepipe, or other thin tubing, may be used if handy. Over the top of the chimney two crosspieces of heavier sheet metal are set, as shown. The vessel rests on these crosspieces, enough space being left underneath for the escape of hot gases from the flame. The cross bars can readily be taken off and packed inside of the chimney for carrying, and this feature makes the device attractive for camp use. The convenience of changing the lamp instantly into a small heater will be clearly seen.—J. G. Allshouse, Vandergrift, Pa.



Safety Valve for a Funnel

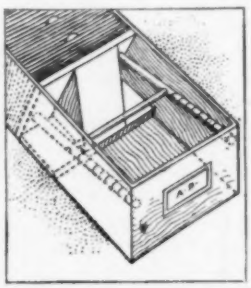
With a funnel fitted up as shown in the sketch, it is possible to fill rapidly with liquid, a number of bottles, without close observation to see when the bottles become full. As the liquid in the bottle being filled reaches a certain level, the flow into it is stopped by the cork valve dropping into the mouth of the funnel, which can then be lifted out and inserted in the next bottle. When lifting the funnel from the full bottle, the finger is placed on the cord at the top, where it goes over the wire bracket attached to the side of the funnel; this keeps the float from dropping while the funnel is being removed to the next bottle. When the finger pressure is released the float drops, raising the cork, and the liquid begins to flow.



In order to have this device work satisfactorily, the principal requirement is that the float and the valve shall bear the proper relations of volume and weight to each other and to the liquid with which they are to be used. It is necessary that the float shall be heavier than the valve, and that the weight of the float in liquid shall be less than the weight of the valve in either the liquid or air. Besides these conditions, the valve must be of the right size to fit in the funnel. The float must be small enough to work freely in the neck of the bottle and heavy enough to overcome any friction of the cord. A good way is to make the float of varnished wood and the valve of a small cork with a metal screw in the center of its lower face. This screw is used merely as a weight, and its size should be such as to bring about the proper relation of weight as stated above. —Violet Johnson, Rockford, Ill.

Simple Follower for Vertical Letter File

A factory clerk, wishing to preserve records in a vertical file in a deep drawer of his desk, was unable to get, through the purchasing department of his factory, a follower or support for his file. Going to the pattern shop, he had made a device like the one illustrated, which was found to work very well. The follower itself consists of three blocks nailed together; to hold it in place, there are two round wooden rods, which extend back to the rear end of the drawer. They were originally made long enough to hold the follower at its farthest forward position. At intervals of about 1 in. along the rods, slots were sawed deep enough so that a piece could be broken off with the fingers; then, as the file expanded, the pieces were broken off one at a time, thus allowing additional room for papers.

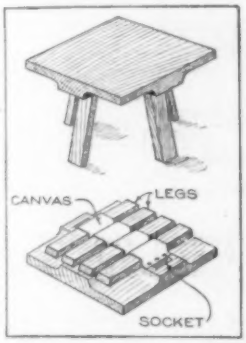


Labeling Bottles with a Dab of Paint

Bottles containing chemicals are readily marked in a durable way by painting a neat 2-in. square on the bottle in green paint, allowing the paint to dry, and scratching in the words or chemical formulas with a nail.—Abel Greenstein, New York, N. Y.

A Folding Portable Stool

The sketch shows a collapsible stool which is readily made from some scraps of lumber. The four legs are mortised into the top of the stool, which should be of wood, about 1¼ in. thick. These sockets should be sunk about ⅞ in., and the legs should fit them quite accurately. When the stool is to be carried, the four legs are simply pulled out and thrust into four loops of canvas, which are formed as shown. The excessive thickness of the block can be cut away around the corners in order to make the stool lighter for carrying.—Pvt. Elmer Tetzlaff, Camp Alfred Vail, N. J.



Put Out Light in Going to Sleep

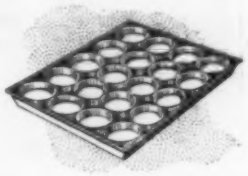
Many persons find that the easiest and quickest way to get to sleep at night is to start reading a book or magazine and gradually "doze off." One objection to this habit is that the electric light often burns all night and wastes much current. To prevent this waste, use a pull socket, and tie a string to the end of the chain; tie the other end of the string to the book, so that as it drops from the hands the light will go out.

A Handle for Safety-Razor Blades

A very useful handle for holding safety-razor blades while they are being sharpened can be made as shown in the sketch. An old spoke from a bicycle, carrying the nut which fits in the bicycle rim, is bent double, and a piece of tubing is slipped on, which is closed at one end, except for a hole big enough to take the spoke. This part of the device may be obtained from an old fountain pen or penholder. The blade is clamped quite tightly by screwing up the nut.—F. M. Viall, Vandalia, Mich.

Muffin Pan Made of Lids from Tin Cans

A muffin pan which gives good service is shown in the illustration. It was made from a number of lids taken from baking-powder cans, fastened into an old shallow pan which was no longer useful for its original purpose. The can lids are held by an aluminum or copper rivet through the center of each; solder must not be used, as it might melt if the pan became overheated.

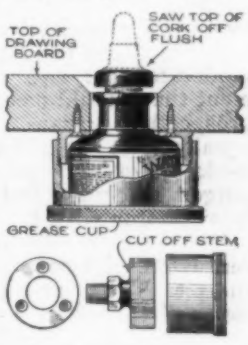


Flexible Drawknife Made from Piece of an Old Saw

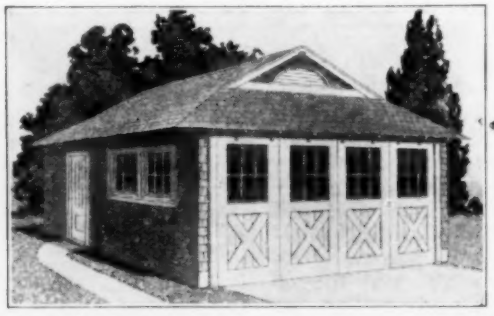
A useful tool in woodworking is a flexible spokeshave, or drawknife, made from the blade of an old saw. A strip, 1 or 2 in. wide, is fitted into handles at the ends and is ground to a sharp edge. The tool makes a good substitute for a more expensive drawknife, and will handle some jobs even more effectively, as the cutting edge can be sprung to fit curved surfaces.—G. A. Vogel, Baltimore, Md.

Novel Ink-Bottle Holder Made from Grease Cups

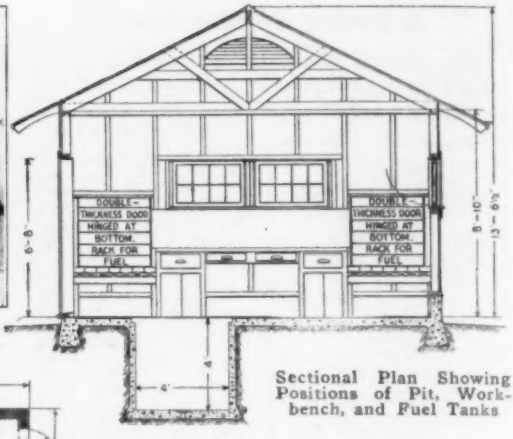
Of the many types of ink-bottle holders for draftsmen which can be purchased or made, few excel for cheapness and convenience the one here illustrated. The bottle holder is simply a grease cup such as used on automobiles, with the bottom cut off; the cup is inverted and fastened with screws to the underside of the drawing table. A hole is made to take the stem of the bottle, and the top of the cork can be sawed off so that it is flush with the surface of the board or table. A No. 2 grease cup is the right size to take the ink bottle. The kink is equally useful for drawing boards, if the farther edge is elevated so that the cup can be inserted underneath.—Frank Ziebell, Jr., Maywood, Ill.



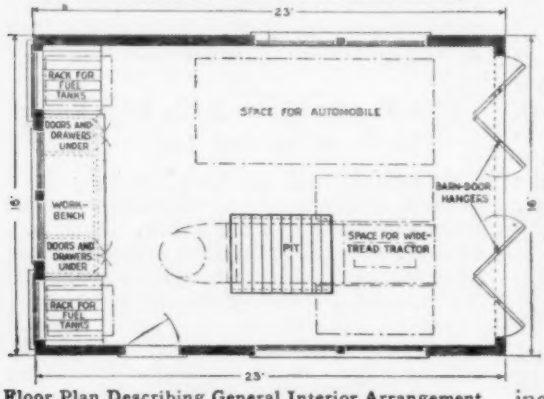
WELL-PLANNED GARAGE FOR TOWN OR COUNTRY



In This Garage, Sightliness and Convenience of Arrangement are Combined with Moderate Cost. The Structure is Equally Suited for Farm and City



Sectional Plan Showing Positions of Pit, Workbench, and Fuel Tanks



Floor Plan Describing General Interior Arrangement of the Garage, Which Is Large Enough to Accommodate Two Seven-Passenger Motor Cars, or One Car and a Tractor

NOW that motor-car production is once more on the upgrade and there is no restriction on building operations, ideas for the private garage may be discussed appropriately. Illustrated herewith are plans for a two-car structure of moderate cost and convenient arrangement that should meet the needs of many prospective urban and rural builders equally well. It will comfortably accommodate two large cars, or one seven-passenger machine and an average-sized farm tractor with broad creeper treads.

It is a frame structure, well lighted and ventilated, with concrete foundation, floor, and pit. The floor drains toward the middle, and the pit is 4 ft. wide, 4 ft. deep, and 5 ft. long. Shingles being both durable and, in comparison with other material, reasonable in price, serve excellently for siding as well as roofing. They may be stained, painted, or left in their natural state, as desired.

Cost obviously depends considerably on locality. Under normal conditions the garage should be erected at a total expense ranging from $650 to $750. If the owner assists in the construction work, the labor charge could be reduced. The materials used ought not cost in excess of $450 this spring.

Reference to the accompanying plans will show that an ample workbench with conveniently situated drawers and inclosed shelves is provided at the rear of the room, and that double windows immediately above it give ample light. At either end of the bench places are designed for fuel tanks which are so arranged that in districts where it is customary to distribute fuel in drums, the latter may be loaded into place from a wagon at the rear without having to be lifted.

The doors are mounted on sliding hangers and may be pushed out of the way, leaving the entire entrance space unobstructed. The eaves overhang sufficiently to protect the interior of the garage on rainy days when the doors happen to be left open. Ventilators are built in the opposite ends of the gable.

Sightliness, no less desirable on the farm than in town or suburb, is one of the attributes of the building. Furthermore, the exterior architecture is of a neutral type that lends itself to almost any site, regardless of the style of surrounding buildings.

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